



Handwritten text, likely bleed-through from the reverse side of the page. The text is faint and difficult to decipher but appears to include the words "The" and "of".

Phys. Lp. 306. 755.

De tellure. *Physica*
352.

Woodward.

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Imprimatur.

John Hoskins, V.P.R.S.

Imprimatur.

John Hoskyns, V.P.R.S.

An ESSAY towards a
Natural History
OF THE
EARTH,
AND
Terrestrial Bodies,
Especially
MINERALS:
As also of the
Sea, Rivers, and Springs.
With an Account of the
UNIVERSAL DELUGE:
And of the *Effects* that it had upon the
EARTH.

By *John Woodward*, M. D. Professor of Physick in
Gresham College: and Fellow of the *Royal Society*.

The Second Edition.

LONDON,
Printed by T. W. for *Richard Wilkin* at the
Kings-Head in *St. Paul's Church-Yard*, 1702.

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BIBLIOTHECA
REGIA
MONACENSIS.

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PREFACE.

HAVING in the Essay it self given some Intimation both of the Design of it, and the Reasons which induced me to make it publick, I shall not here keep the Reader in suspense much longer than only while I acquaint him that, proposing to draw a considerable number of Materials into so narrow a Compass that they might all be contained in this small Volume, I was obliged to be very brief and concise. And therefore, as Pieces of Miniature, Sculpture, or other Workmanship in little, must be allowed a closer Inspection, so this Treatise will require some Care and Application in the Perusal.

Not but that I have endeavoured, as far as was practicable in so little room, so

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to dispose and order things, by interweaving with the Assertions some of the Proofs whereon they depend, and occasionally scattering several of the more important Observations throughout the Work, that it will be no very hard Task for any one to discover the main Grounds whereon all that I here advance is founded.

That this may be the more clearly apprehended, I shall beg leave to illustrate it by one or two Instances. It will perhaps at first sight seem very strange, and almost shock an ordinary Reader to find me asserting, as I do, that the whole Terrestrial Globe was taken all to pieces and dissolved at the Deluge, the Particles of Stone, Marble, and all other solid Fossils dissevered, taken up into the Water, and there sustained together with Sea-shells and other Animal and Vegetable Bodies: and that the present Earth consists, and was formed out of that promiscuous Mass of Sand, Earth, Shells, and the rest, falling

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falling down again, and subsiding from the Water. But whoever shall duely attend to what I elsewhere lay down, viz. that there are vast Multitudes of Shells, and other Marine Bodies, found at this day incorporated with and lodged in all sorts of Stone, in Marble, in Chalk, and to be short, in all the other ordinary Matter of the Globe which is close and compact enough to preserve them : that these are found thus repositied amongst this Terrestrial Matter from near the Surface of the Earth downwards to the greatest Depth we ever dig or lay it open, and this in all Parts of it quite round the Globe : that the said terrestrial Matter is disposed into Strata or Layers, placed one upon another, in like manner as any earthy Sediment, setling down from a Fluid in great quantity, will naturally be : that these Marine Bodies are now found lodged in those Strata according to the Order of their Gravity, those which are heaviest lying deepest

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deepest in the Earth, and the lighter sorts (when there are any such in the same place) shallower or nearer to the Surface: and both those and these amongst terrestrial Matter which is of the same specifick Gravity that they are, the heavier Shells in Stone, the lighter in Chalk, and so of the rest; I say, whoever shall but rightly weigh all this, he'll have no need to go further for Proof that the Earth was actually so dissolved, and afterwards framed a-new, in such manner as I have set forth. And if to this he shall think fit to add the other Arguments of the same Thing which he will meet with in their Place, they also will I hope not fail of doing their Part in convincing him still more of the Truth and Certainty of this Matter.

The other Instance I make choice of shall be of the Universality of the Deluge, which is another Proposition that I insist upon. And for this, let but the Reader please to consider, what I deliver from authentick
Rela-

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Relations, that the marine Bodies afore-said are found in all Parts of the known World, as well in Europe, Africa, and America, as in Asia, and this even to the very tops of the highest Mountains; and then I think he cannot reasonably doubt of the Proposition; but more especially if hereunto he shall joyn what I offer concerning the Great Abyss, and thence learns that there is at this day resident, in that huge Conceptacle, Water enough to effect such a Deluge, to drown the whole Globe, and lay all, even the highest Mountains under Water. But if he should be at a loss to know how I got such Notice of that subterranean Reservoir as to enable me to make a Computation of the Quantity of Water now conceal'd therein, if he carefully peruse the Propositions concerning Earthquakes, and some others in the Third Part, he cannot but discover at least some of the ways whereby I got light thereinto: and at the same time find why it is that I am so particular

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particular in relating the Phænomena of Earthquakes, and dwell so long upon that Subject in this shorter Work.

These I intend for Example and Direction to the Reader how he may satisfy himself in any of the other Heads. 'Tis impossible for me to foresee the Difficulties and Hesitations of every one; they will be more or fewer, according to the Capacity of each Peruser, and as his Penetration and Insight into Nature is greater or less. They who have Attention enough to take in the intire Platform as here laid down: who see the Chain which runs through the whole: and can pick up and bear in mind the Observations and Proofs here and there as they lie, and then confer them with the Propositions, will discern (in great measure) how those Propositions flow from them; but they, who cannot so easily do this, must be intreated to have a little patience, untill the Thing be farther unfolded, and more amply and plainly made out.

A few

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A few Advances there are, in the following Papers, tending to assert the Superintendence and Agency of Providence in the Natural World: as also to evince the Fidelity and Exactness of the Mosaick Narrative of the Creation, and of the Deluge. Which 'tis not improbable but some may be apt to stumble at, and think strange that in a Physical Discourse, as this is, I should intermeddle with Matters of that kind. But I may very safely say, that, as to the former, I have not entered farther into it than meerly I was lead by the necessity of my Subject: nor could I have done less than I have, without the most apparent Injury and Injustice to Truth. And for Moses, he having given an Account of some Things which I here treat of, I was bound to allow him the same Plea that I do other Writers, and to consider what he hath delivered. In order to this I set aside every thing that might byass my Mind, over-awe, or mislead me in the
Scrutiny;

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Scrutiny ; and therefore have regard to him here only as an Historian. I freely bring what he hath related to the Test, comparing it with Things as now they stand: and finding his Account to be punctually true, I fairly declare what I find; wherein I do him but simply Right, and only the same that I would to a common Historian, to Berofus or Manetho, to Herodotus or Livy, on like occasion.

The

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ERRATA.

PAge 19. in the Margin for p. 22, 23. read p. 21, 22. p. 65. in the Margin for p. 29. r. p. 28. and for p. 8. ib. r. p. 27. p. 167. in the Margin for p. 55. and 95. r. p. 54. and 94. p. 227. line 6. for *suppositious* read *supposititious*, ib. line 13. after but dele (.) p. 274. in the Margin, near the bottom, for *lines* read *Lines*.

A N

I

*An Account of the Observa-
tions upon which this Dis-
course is Founded:*

FROM a long Train of *Experi-
ence*, the World is at length
convinc'd, that *Observations*
are the only sure *Grounds*
whereon to build a lasting and sub-
stantial *Philosophy*. All *Parties* are
so far agreed upon this matter, that
it seems to be now the common *Sense*
of *Mankind*.

For which reason I shall, in the
Work before me, give my self up to
be guided wholly by *Matter of Fact*;
as intending to steer that *Course* which
is thus agreed of all hands to be the
best and *surest*: and not to offer any
thing but what hath due warrant
from *Observations*; and those both
carefully made, and faithfully rela-
ted.

And that each Reader may the bet-
ter inform himself, not only of *what*
B sort

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sort my present *Observations* are, but see in what *Manner* also, and with what kind of *Accuracy* they were made, 'twill be convenient to give some light into that Matter, and to begin with an *Account* of them; whereby he may be enabled to judge how far they may be *relyed* upon, and what measure of *Assent* the *Propositions* which I draw from them may claim.

But before I go any farther, I ought to put in a *Caution*, that an *ample* and *prolix* *Relation* either of the *Observations* themselves, or of the *Deductions* from them, is not to be expected here. I intend *this* but for a *Scheme* of a *larger* *Design*, and as a *Sample* of what I hope, in good time, more fully to discuss and make out; proposing no more in *this* *Treatise*, than only in a few plain words, to deliver my *Sentiments* on certain *Heads* of *Natural History*, with some of the *Reasons* and *Grounds* of them, in order to give somewhat of present Satisfaction to the Curiosity and Demands of some of my Friends.

The *Observations* I speak of were all made in *England*; the far greatest part whereof I travelled over on *purpose*

pose to make them: professedly searching all *Places* as I pass'd along, and taking a careful and exact view of *Things* on all hands as they presented; in order to inform my self of the *present Condition* of the *Earth*, and all *Bodies* contained in it, as far as either *Grotto's*, or other *Natural Caverns*, or *Mines*, *Quarries*, *Colepits*, and the like, let me into it, and displayed to sight the *interiour Parts* of it. Nor, in the mean time, did I neglect the *exteriour* or *Surface*: and such *Productions* of it as any where occurred, *Plants*, *Insects*, *Sea*, *River*, and *Land Shells*: and, in a word, whatever either the *Vegetable* or *Animal World* afforded.

Nor did I confine these *Observations* to *Land*, or the *Terrestrial Parts* of the *Globe* only, but extended them to the *Fluids* of it likewise, as well those within it, the *Water* of *Mines*, of *Grotto's*, and other such like *Recesses*, as those upon the *Surface* of it, the *Sea*, *Rivers*, and *Springs*.

My principal Intention indeed was to get as compleat and satisfactory *information* of the whole *Mineral Kingdom* as I could possibly obtain. To which end, I made strict *Enquiry*

wherever I came, and laid out for intelligence of *all Places* where the *Entrails* of the *Earth* were *laid open*, either by Nature (if I may so say) or by Art, and humane Industry. And wheresoever I had notice of any considerable *natural Spelunca* or *Grotto*: any sinking of *Wells*: or digging for *Earths*, *Clays*, *Marle*, *Sand*, *Gravel*, *Chalk*, *Cole*, *Stone*, *Marble*, *Ores* of *Metalls*, or the like, I forthwith had recourse thereunto; where taking a just account of every observable *Circumstance* of the *Earth*, *Stone*, *Metall*, or other *Matter*, from the *Surface* quite down to the *bottom* of the *Pit*, I entered it carefully into a *Journal*, which I carry'd along with me for that purpose. And so passing on from Place to Place, I *noted* whatever I found *memorable* in each particular *Pit*, *Quarry*, or *Mine*; and 'tis out of these *Notes* that my *Observations* are compiled.

After I had *finish'd* these *Observations*, and was *returned* back to this *City*, such were the *Commotions* which had then so unhappily invaded *Europe*, that I saw I must necessarily desist here, and sit down (for the present at least) with what I had already

dy done; having little prospect of an opportunity of *carrying on* these *Observations* any farther, or of going beyond Seas, to consider the State of the Earth, and of all sorts of Fossils, in more distant Countries.

But to supply, as far as possible, that Defect, I made Application to Persons who had already travelled, and I knew were of such Integrity, that they would not impose uncertain or false Relations upon me: as also of so much Curiosity as to be likely to give me some tolerable Insight into the condition of these Things in Foreign Regions. I likewise drew up a List of *Queries* upon this Subject; which I dispatch'd into all Parts of the World, far and near, wherever either I myself, or any of my Acquaintance, had any Friend resident to transmit those *Queries* unto.

The Result of this was, that in time I was abundantly assured, that the Circumstances of these Things in remoter Countries were much the same with those of ours here: that the Stone, and other terrestrial Matter, in France, Flanders, Holland, Spain, Italy, Germany, Denmark, Norway, and Sweden,

was distinguished into *Strata*, or *Layers*, as it is in *England*: that those *Strata* were divided by *parallel Fissures*: that there were enclosed in the *Stone*, and all the other denser kinds of *terrestrial Matter*, great numbers of *Shells*, and other *Productions* of the *Sea*; in the same manner as in *that* of *this Island*. To be short, by the same means I got sufficient intelligence that *these Things* were found in like manner in *Barbary*, in *Egypt*, in *Guiney*, and other parts of *Africa*: in *Arabia*, *Syria*, *Persia*, *Malabar*, *China*, and other *Asiatick Provinces*: in *Jamaica*, *Barbadoes*, *Virginia*, *New-England*, *Brasil*, *Peru*, and other parts of *America*. But I reserve the more *particular Relation* hereof to its proper place.

So that though my *own Observations* were confined to *England*, yet by this means I was made acquainted with the state of *these Bodies* in other *Countries*; even in almost all *Parts* of the *World* wherewith the *English* maintain any *Commerce* or *Correspondence*: and learn'd from all hands, that the *State* of them *there* was conformable to that of ours *here*, in the main, and as far as I shall lay any stress

strengthen upon it in my *Conclusions*; which indeed are not built upon any *Niceties*, or solitary and uncommon *Appearances*, but on the most simple and obvious *Circumstances* of these terrestrial *Bodies*.

As to the *Certainty* and *Accurate-ness* of my *Observations*, thus much may modestly and very truly be said; that I do not offer *any one* before I had first thoroughly and clearly *informed* my self in all material *Circumstances* of it: and had opportunity of observing it in *more Places* than *one*, that I might be satisfied there was nothing *casual* or *contingent* in any of those *Circumstances*. This will not be thought an over-great *exactness*, or any thing more than was *needful*, by *those* who have noted how much *Philosophy* hath suffered by the *neglect* and *oversight* of some *Naturalists* in this respect. A *transient* and *perfunctory Examination* of things, frequently leads Men into considerable *Mistakes*, which a more *correct* and *rigorous Scrutiny* would have detected and avoided. The truth is, I have been the more scrupulous and wary in regard the *Inferences* drawn from these *Observations* are of

some *Importance*. 'Twas but necessary that the *Foundation* should be *firm*, when a *Superstructure* of *Bulk* and *Weight* was to be raised upon it. And therefore I advance nothing from any *Observation* that was not made with this *Caution*, and that any *Man* may not, as well as my self, without any great pains, inform himself of the *Truth* of. Now as long as the next *Cole-pit*, or *Mine*, the next *Quarry*, or *Chalk-pit*, will give abundant *Attestation* to what I write; *these* are so ready and obvious in almost all places, that I need not be any where far to seek for a *Compurgator*; and to these I may very safely appeal.

Concerning the *Observations* themselves therefore, there cannot well arise any *Doubt* but what may be easily satisfied: And what I propose in this *Essay* being founded upon these *Observations*, every *Reader* will be judge of the *Truth* and *Probability* of it, and whether *that* which I do so propose naturally *follows* from them or not.

I shall distribute *them* into two general *Classes* or *Sections*, whereof the *former* will comprehend my *Observations* upon all the *Terrestrial Matter* that

that is naturally *disposed* into *Layers*, or *Strata*; such as our common Sandstone, Marble, Cole, Chalk, all sorts of Earth, Marle, Clay, Sand, Gravel, with some others.

Of this various Matter, thus formed into *Strata*, the far *greatest* part of the *Terrestrial Globe* consists, from its *Surface* downwards to the *greatest Depth* we ever dig or mine. And it is upon my Observations on *this* that I have grounded all my *general Conclusions* concerning the *Earth*: all that relate to its *Form*: all that relate to the *Universal* and *other Deluges*: in a word, all that relate to the several *Vi-
cissitudes* and *Alterations* that it hath yet undergone. Nay, upon the same Observations I have also founded several *Conclusions* touching *Metalls*, *Spar*, and other *Minerals*, which are found lodged either in these *Strata*, amongst the Sand, Chalk, Earth, and the rest: or in the *perpendicular Intervalls* of the *Strata* of Stone, Marble, or other solid Matter.

For upon the *particular* Observations on the said *Metallick* and *Mineral Bodies*, (which are the Subjects of the *second Section*,) I have not founded
any

any thing but what purely and immediately concerns the *Natural History* of *those Bodies*.

To proceed therefore to the Account of my Observations upon *Sand-stone*. And in *these*, though I do not neglect to note the *several Kinds* or Varieties of it: *Free-stone*, *Ragg-stone*, *Lime-stone*, and the rest: the different *Hardness*, or *Solidity*, of each: as also its *Colour*, *Texture*, and the *peculiar Matter* which constitutes it; yet I confine my self more strictly to consider the *Manner* how 'tis *disposed* in the *Earth*: the *Strata*, into which, by means of

|| I call those Fissures, which distinguish the Stone into Strata, Horizontal ones: and those which intersect these, Perpendicular; not so much with respect to the present Site of the Strata, which (as I shall shew) is altered in many places: as to its original Situation, concerning which, see Part 2. Consect. 5.

horizontal || and parallel Fissures, it is divided: the Order and Number of these Strata: their Situation in respect of the Horizon: the Thickness, Depth, and other Circumstances of each: the Interruptions of the Strata, I mean the perpendicular || Fissures, which intersect the horizontal ones: the different Capacity or Largeness of these perpendicular Intervalls: their Distances from each other: and the Spar, and other
Mine-

Mineral and Metallick Matter, usually contained in them.

But, because I saw that *Deductions* of considerable *import* and *consequence* might be drawn from them, I have with great *Care* and *Intention* observed the *Condition* of such *heterogeneous Bodies*, which I found immersed and included in the *Mass* of this *Sandstone*: particularly the *Shells* of *Oysters*, *Muscles*, *Scallopes*, *Cockles*, *Periwinkles*, and very many other *marine Productions*. I have, I say, very diligently noted all *Circumstances* of these *Shells*: the vast *Numbers* of them: the several *Kinds* that are thus lodged in the substance of the Stone: the *Order* and *Manner* of their position in it: the several *Depths* at which they are found: the *Matter* which they contain in them, and wherewith their *Cavities* are usually filled.

These *Observations* about Stone are succeeded by *others*, of like nature, concerning *Marble*, *Cole*, and *Chalk*: their *Fissures*: the *Situation* of their *Strata*: the *Shells*, and other *heterogeneous Bodies* lodged therein.

In the next place, *those* which concern *Marle*, *Clay*, the several kinds of
Earth,

Earth, Sand, Gravel, and some other Fossils: the Shells and other like Bodies, lodged in their Strata: the Position of those Strata: their Order: their Distinctions from each other, by the difference of the Matter of each, and by its different Consistence and Colour; the Strata of these laxer kinds of Matter being not ordinarily divided from each other by interposition of horizontal Fissures, as those of Stone, and such other solid Matter, constantly are.

And lastly, those which relate to the upper or outmost *Stratum* of all: I mean that *blackish Layer* of *Earth* or *Mould* which is called by some *Garden-Earth*, by others *Under-turf-Earth*, wherewith the *Terrestrial Globe* is almost every where *invested*, unless it be disturbed, or flung off by rains, digging, plowing, or some other external force; inasmuch, that whatsoever lies deeper, or underneath, whether *Stone, Marble, Chalk, Gravel, or whatever else*, this *Stratum* is still expanded at top of all; serving, as it were, for a *common Integument* to the rest: and

*Part. v. being (as shall be shewn in due place *)
 Confess. 1. the *Seminary or Promptuary* that furnisheth

nisheth forth *Matter* for the formation and increment of *Animal* and *Vegetable Bodies*; and into which all of them successively are again finally *returned*.

The *Observations* being thus dispatch'd, my next step should have been to have proposed the *Deductions* from them: to have determined how these *Sea-shells* were brought to *Land*, and how they became interr'd in the bowels of the *Earth*, in the manner described in those *Observations*. But before I could proceed any farther towards *that*, I found my self necessarily obliged to take off a *Difficulty* started by some *learned Men* who have wrote now *lately* upon the Subject, and assert that these *Shells* are not *real*: that they were never bred at *Sea*: but are all of *Terrestrial Original*, being *meer Stones*, though they bear a resemblance of *Shells*, and formed, in the *Places* where they are now found, by a kind of *Lusus* of *Nature*, in imitation of *Shells*.

How nearly I am concerned to *remove* this *Obstacle*, before I pass on any farther to the prosecution of my *Design*, any one may presently see. For to go about to enquire at *what time*,
and

and by *what means* these *Shells* were conveyed out of the *Sea* to dry *Land*, when a *Doubt* hath been moved whether they are *Shells* or not, or ever belonged to the *Sea*, without first *clearing* this *Matter*, and putting it quite out of doubt, would be senseless and absurd. In order therefore unto *this*, I premise,

A Dissertation concerning Shells and other marine Bodies, found at Land; Proving that they were originally generated and formed at Sea: that they are the real spoils of once living Animals: and not Stones, or natural Fossils, as some late Learned Men have thought.

IN my Extract of this *Dissertation* I shall fairly, and in as little *Compass* as may be, lay before the *Reader*, first the *Arguments* that have been urged by these *Writers* to perswade us
that

that these *Bodies* are meer *Mineral Substances*. And having detected the *Insufficiency* of them, by evincing how far they are from being *conclusive*, and how much they fall short of *proving* what they are alledged for; I shall then proceed to lay down a brief Scheme of *my own*, and offer some of the *Reasons* which have induced me to believe that these are the very *Exuvia* of *Animals*, and all owing to the *Sea*.

I would not be thought to insinuate that the *Opinion* of these *Gentlemen* carries no shew of *Truth*, nor umbrage of *Reason* of its side. 'Tis not to be supposed, that *Persons* of their *Learning* and *Abilities* would ever have espoused it, were it not in some measure *plausible*: and had not at least a fair appearance of *probability*. The very finding these *Bodies* included in *Stone*, and lodged in the *Earth* together with *Minerals*, was alone enough to move a Suspicion that *these* were *Minerals* too. The finding them even to the very *bottom* of *Quarries* and *Mines*: in the most retired and *inward Parts* of the most *firm* and *solid Rocks*: in the *deepest* bowels of the *Earth*, as well as upon the surface of it: upon
the

the *tops* of even the *highest Hills* and *Mountains*, as well as in the *Valleys* and *Plains*: and this not in this or that *Province* only, not only in one or two *Fields*, but almost *every where*: in all *Countries* and *Quarters* of the *Globe*, wherever there is any *digging* for *Marble*, for *Stone*, for *Chalk*, or any other *Terrestrial Matter* that is so *compact* as to fence off *external Injuries*, and shield them from *Decay* and *Rottenness*. *This*, together with their

i. “being lodged in company of the
 “*Belemnites*, *Selenites*, *Marcha-*
 “*sits*, *Flints*, and other like *Bodies*,
 “which were incontestibly *natural*
 “*Fossils*, and, as *they* supposed, in the
 “*Place* of their *formation*, ” was e-
 nough to stagger a *Spectator*, and make
 him ready to entertain a belief that
these were so too. ’Tis a *Phænomenon*
 so surprizing and extraordinary, that
 ’tis not strange that a *Man* should
 scarcely credit his very *Senses* in the
 case: that he should more readily in-
 cline to believe that they were *Minerals*
 as the *Belemnites*, and the others re-
 cited, are: or indeed almost any thing
 else rather than *Sea-Shells*; especially
 in such *Multitudes*, and in *Places* so
 unlikely:

unlikely: so deep in the Earth, and far from the Sea, as these are commonly found.

Nor was this, as indeed they tell us, the only Difficulty these worthy Persons had to surmount; "They found, together with these, certain Bodies that bore the shape and resemblance of Cockles, Muscles, and other Shells, which yet were not really such; but consisted intirely, some of them, of Sand-stone: others of Flint: and others of Spar: or some other kind of Mineral Matter."

2.

Nay, they met with some, "That were in all appearance Shells: that were of the same Bigness, Figure, and Texture, with the common Echini, Scallops, and Perewinkles; but had notwithstanding Flint, Native-Vitriol, Spar, Iron-Ore, or other Mettallick or Mineral Matter, either adhering firmly in lumps to the outsides of them, or insinuated into their Substance, into their Pores, and inner Parts, so as to disguise them very much, and give them a Face and Mien extremely unlike to that of those Shells which are at this day found at Sea."

3.

C

They

4. They observed also, that “ amongst
 “ the *Shells*, that were *fair, unaltered,*
 “ and *free* from such *Mineral Insinua-*
 “ *tions*, there were *some* which could
 “ not be *match'd* by any species of
 “ *Shell-fish now found* upon the *Sea*
 “ *shores.* ”

5. And that on the contrary, “ there
 “ were several *Shells* found commonly
 “ upon the said *Shores*, such as the
 “ larger *Shells* of the *Buccina*, of the
 “ *Concha Veneris*: of *Crabs*, *Lobsters*,
 “ and others, both of the *Crustaceous*
 “ and *Testaceous* kind, which yet we
 “ never meet with at *Land*, or in our
 “ *Quarries.* ”

Nay there were some other *Diffi-*
culties which they have urged, and
 which (though they be of *lesser weight*)
 shall all of them be recounted and con-
 sidered more particularly in due Place.

Upon the whole therefore 'tis very
 plain, that these Authors did not es-
 pouse *this Opinion* without some
Grounds: without some countenance
 of *Probability*: and that they have
 charged the *opposite* with a large crowd
 of *Difficulties*. Yea so far are they
 from being destitute of an handsome
Apology, that they very well deserve
 the

the *Thanks* of the *World* for what they have done. For although they have not succeeded in their *Attempts* about the *Origin* of *these Bodies*, yet they have made *Discoveries* in other respects concerning *them*, and in *other parts* of *Nature* likewise, of that *Moment* and *Consequence*, as to have thereby laid a great and lasting *Obligation* upon the intelligent and discerning part of *Man-kind*.

But that they have *failed* notwithstanding in *this Enterprize*, 'tis, I think, not over difficult to *prove*. And *this* is the Subject of the present *Discourse*. Wherein I hope to make out, that the *Sea* gave Birth to *these Bodies*: * that *they* are so far from being formed in the *Earth*, or in the *Places* where they are now found, that even the *Belemnites*, *Selenites*, *Marchasits*, *Flints*, and other natural *Minerals*, which are lodged in the *Earth*, together with *these Shells* were not formed *there*, but had *Being* before ever they came *thither*: and were fully *formed* and *finished* before they were reposed in that manner. †

That the above mentioned *Bodies* which consist of *Stone*, of *Spar*, *Flint*,

I.

* Vid. Pag. 22, 23, &c.

† Confer. Part. IV. Consect. 2.

* Concern-
ing these
Conchitæ,
Cochlitæ,
Ec. See
Part 4.
Conf. 2. &
Part 5.
Conf. 5.

and the like, and yet carry a *resem-
blance* of Cockles, Muscles, and other
Shells, were originally formed in the
Cavities of *Shells* of those kinds which
they so resemble; these *Shells* having
served as *Matrices* or *Moulds* to them;
the Sand, Sparry and Flinty Matter
being then *soft*, or in a *state* of *solati-
on*, and so, susceptible of any *Form*,
when it was thus introduced into these
shelly-Moulds: and that it consolida-
ted, or became *hard* afterwards *.

3. That for the *Metallick* and *Mineral*
Matter which sometimes adheres to
the *Surfaces* of these *Shells*, or is in-
truded into their *Pores*, and lodged in
the *Interstices* of their *Fibres*, 'tis all
manifestly *adventitious* †; the *mineral*
Particles being plainly to be distin-
guished from the *testaceous* ones, or the
texture and substance of the *Shell*, by
good *Glasses*, if not by the naked *Eye*.
That though the thing had been so
that this *Accretion* had not been thus
discernible, and consequently the *Al-
teration* of these *Shells* could not have
been accounted for, so that we had
been perfectly in the dark as to the *O-
rigin* of the *Bodies* thus *altered*, and
that nothing at all could have been
determined

† Part 4.
Conf. 2.

determined concerning *them*; yet *this* would not have been any the least *Impediment* or *Objection* against that which I insist upon; there being so *very few* of *these* in comparison of *those* which have undergone no such *Alteration*. There being, I say, besides *these*, such vast *multitudes* of *Shells* contained in *Stone*, &c. which are *intire*, *fair*, and absolutely free from any such *mineral Contagion*: which are to be *match'd* by others at this day found upon our *Shores*, and which do not differ in any respect from them: being of the *same size* that *those* are of, and the *same shape* precisely: of the *same substance* and *texture*; as consisting of the *same peculiar Matter*, and this constituted and disposed in the *same manner*, as is that of their respective fellow-kinds at *Sea*: the *tendency* of the *Fibres* and *Striae* the same: the *composition* of the *Lamellæ*, constituted by these *Fibres*, alike in both: the same *Vestigia* of *Tendons* (by means whereof the *Animal* is fastned and joyned to the *Shell*) in each: the same *Papillæ*: the same *Sutures*, and every thing else, whether *within* or *without* the *Shell*, in its *Cavity* or upon its *Convexity*, in

the *Substance*, or upon the *Surface* of it. Besides; these *Fossil Shells* are attended with the ordinary *Accidents* of the *marine ones*, *ex. gr.* they sometimes grow to one another, the *lesser Shells* being fix'd to the *larger*: they have *Balani*, *Tubuli vermiculares*, *Pearls*, *Coral*, and the like *still* actually growing upon them. And which is very considerable, they are most exactly of the same *specifick Gravity* with their fellow-kinds now upon the *Shores*. Nay farther, they answer all *Chymical Tryals* in like manner as the *Sea-shells* do: their *Parts* when *dissolved* have the same *appearance* to view, the same *Smell* and *Taste*: they have the same *vires* and *Effects* in *Medicine*, when inwardly administred to *Animal Bodies*: *Aqua fortis*, *Oyl of Vitriol*, and other like *Menstrua*, have the very same *Effects* upon both. In one word, so exactly conformable to the *marine ones* are these *Shells*, *Teeth*, and *Bones*, which are *digged* up out of the *Earth*, that though several *Hundreds* of them, which I now keep by me, have been nicely and critically *examined* by very many *Learned Men*, who are skill'd in all parts of *Natural History*, and
 who

who have been particularly curious in, and conversant with *Shells*, and other *marine Productions*, yet never any Man of them went away *dissatisfied*, or *doubting* whether these are really the very *Exuvia* of Sea-fishes or not. Nay, which is much more to my purpose, some of the most *eminent* of those very *Gentlemen* who formerly were *doubtful* in this *Matter*, and rather inclinable to believe that these were *natural Minerals*, and who had *wrote* in defence of that *Opinion*, do notwithstanding upon strict and repeated *Inspection* of these *Bodies* in my *Collection*, and upon *farther Enquiry*, and procuration of *plain* and *unalter'd* Shells from several parts of this *Island*, fully assent to me herein, and are now *convinced* that these are the *Spoils* and *Remains* of *Sea-Animals*. And, being thus satisfied, such is the *Ingenuity* of these worthy Persons, and so great their Affection to *Truth*, that they have personally requested me to *publish* my *Thoughts* in order to the fuller *clearing* of this *matter*. But to proceed.

That although I can *pair*, with *Sea-Shells*, several of these *Fossil ones* that these *Gentlemen* have pronounc'd altogether

gether *unlike* any thing that the *Salt-Water* produceth; yet 'tis indeed very true, that there are found *some Shells* at *Land*, in *Stone*, and in *Chalk*, which cannot probably be *match'd* by any species of Shells *now* appearing upon our *Shores*. But notwithstanding this, I cannot but affirm that *these*, even the most strange and enormous of them, have all the essential Notes and Characters of *Sea-Shells*, and shew as near a *Relation* to some *now extant* upon the *Shores* as the different Species of *those* themselves do to one another: that they are of the very same *specifick Gravity* with those to which they are so generically allyed: and of the same *Texture* and *Constitution* of Parts; the *substance* of *these* being as plainly *Testaceous*, as *that* of *those* is; insomuch that any Man that *compares* them, can no more *doubt* of the *Reality* of the *one* than of the *other*. Whence it must needs follow, that there were such *Shell-fish once in being*; which is enough for my purpose; I being no ways concerned to make out that there are of the same kinds *still actually living* in the *Ocean*. Though if I *was*, 'twould be no very hard task; it being evident from

from the *Relations* of *Dyvers*, and *Fishers* for *Pearls*, that there are *many Kinds* of *Shell-fish* which lye perpetually *concealed* in the *Deep*, skreen'd from our *Eyes* by that vast *World* of *Water*, and which have their continual *Abode* at the *Bottom* of the *Ocean*, without ever approaching near the *Shores*; it being as unnatural for *these* to desert this their *native station*, as 'tis for *those* that are the *Inhabitants* of the *Shores*; to quit *theirs*, and retire into the *Deep*. That for this reason *these* are called by Naturalists *ἐμβύδιοι*, and *Pelagie*; as the *others*, that reside nearer to the *Shores*, are by them called *Littorales*. Now the *Shells* which we find *exposed* upon our *Shores*, are only those which are cast up and stranded by *Tides* and by *Storms*: and consequently are all of them *Exuvie* of those *Kinds* that *live* near the *Shores*, and not of *those* that inhabit the *Main*, or the *deeper* and *remoter* Parts of the *Ocean*; it being certain from the *Relations* also of *Dyvers*, that the *Tides* and *Storms*, even the most tempestuous and turbulent, affect only the *superficial* Parts of the *Ocean*, the *Shallows*, and *Shores*, but never reach the greater

greater *Depths*, or disturb the *bottom* of the *Main*. These are as *quiet*, and free from *Commotion* in the midst of *Storms*, as in the greatest *Calm*. So that the *Shell-fish*, which are resident in *these* places, live and dye *there*, and are *never* dislodged or *removed* by storms, nor cast upon the *Shores*, which the *Littorales* usually are. When therefore I shall have proved more at large, that *those* which we find at *Land*, that are not matchable with any upon our *Shores*, are many of them of *those* very kinds which the forecited *Relations* particularly assure us are found no where but in the *deeper parts* of the *Sea*: and that as well *those* which we *can* match, as *those* we *cannot*, are all *Remains* of the *Universal Deluge*, when the *Water* of the *Ocean*, being boisterously turned out upon the *Earth*, bore along with it *Fishes* of all sorts, *Shells*, and the like moveable Bodies, which it *left behind* at its *Return* back again to its *Chanel*; it will not, I presume, be thought *strange*, that amongst the *rest*, it left some of the *Pelagiae*, or *those* kinds of *Shells* which naturally have their abode at *Main-Sea*, and which therefore are
now

now never flung up upon the *Shores*. And it may very reasonably be concluded, that all these *strange* Shells, which we cannot so *match*, are of these *Pelagicæ*: that the several kinds of them are at *this day* living in the *huge Bosom* of the *Ocean*: and that there is not any one intire *Species* of *Shell-fish*, formerly in Being, now *perish'd* and *lost*.

That it is also very true that there are *some* Shells, such as those of the larger *Buccina*, and *Conchæ Veneris*, of *Lobsters*, *Crabs*, and others of the *crustaceous Kind*, that are very rarely found at Land; so *rarely*, that some of these Gentlemen have asserted that they are *never* found; but *that* I shall shew to be a *Mistake*, all the Shells in their whole *List* having been found in the *Earth* in one place or other. But that these are very *seldom* found any where, I most readily grant; and this is so far from being an Argument against what I am going to advance, that 'tis as full and substantial a *Proof* of the *Truth* of it as I could possibly wish. For the Shells in *this List* are all *lighter* than *Stone*, *Marble*, and the other ordinary *Terrestrial Matter*.

Now

Now both *these* and all other sorts of *Shells* that are *so light*, occur very *seldom* at *Land*, or in the *Earth*, in comparison of the *Shells* of *Cockles*, *Pere-winkles*, and the rest which are more *ponderous*, so as to equal the *Stone*, and the other *Terrestrial Matter* in *Gravity*. The Reason of which will be very plain, when I shall have shewn * that at the time of the *Deluge* (when these *Shells* were brought out upon the *Earth*, and reposed therein in the manner we now find them) *Stone*, and all other solid *Minerals*, lost their *Solidity*: and that the sever'd Particles thereof, together with those of the *Earth*, *Chalk*, and the rest, as also *Shells*, and all other *Animal* and *Vegetable Bodies*, were taken up into, and sustained in, the *Water*: that at length all these subsided † again promiscuously, and without any other Order than that of the different *Gravity* of the several *Bodies* in this confused *Mass*; those which had the greatest degree of *Gravity* sinking down first, and so settling lowest; then those *Bodies* which had a lesser *Share* of it fell next, and settled so as to make a *Stratum* upon the former; and so on, in their

* Vid.
Part 2.
Cons. 2.

† Vid.
Part 2.
Consect. 3.

their *several turns*, to the *lightest* of all, which *subsiding last*, settled at the *Surface*, and covered all the rest. Now this very various *Miscellany* of *Bodies* being determined to *Subsidence* in this *Order* meerly by their *different Gravities*; all those which had the *same degree* of *Gravity* subsided at the *same Time*, and fell into, and composed the *same Stratum*. So that those *Shells* and other *Bodies*, that were of the *same Specific Gravity* with *Sand*, sunk down together with it, and so become inclosed in the *Strata* of *Stone*, which *that Sand* formed or constituted. Whilst those which were *lighter*, and of but the *same specific Gravity* with *Chalk* (in such *places* of the *Mass* where any *Chalk* was) fell to the bottom at the *same time* that the *Chalky Particles* did, and so were entombed in the *Strata* of *Chalk*; and in like manner all the rest. Accordingly we now find in the *Sand-stone* of all Countries (the *specific Gravity* of the several sorts whereof is very little different, being generally to *Water* as $2\frac{1}{2}$ or $2\frac{2}{3}$ to 1) only those *Concha*, *Pectines*, *Cochleæ*, and other *Shells* that are nearly of the same *Gravity*, viz. $2\frac{1}{2}$ or $2\frac{2}{3}$ to 1.

But

But these are ordinarily found enclosed in it in *prodigious numbers*; whereas of *Oyster-shells*, (which are in Gravity but as about $2\frac{1}{3}$ to 1) of *Echini* (which are but as 2 or $2\frac{1}{8}$ to 1) or the other *lighter kinds* of Shells, *scarce one* ever appears therein. On the contrary, in *Chalk* (which is *lighter* than *Stone*, being but as about $2\frac{1}{10}$ to 1) there are *only* found *Echini*, and the other *lighter* sorts of Shells; it being extremely unusual to meet with so much as *one single Shell* of any of all the *heavier kinds* amongst *Chalk*; but for the said *Echini*, and other the *lighter* sorts of Shells, they are very *numerous* and *frequent*, in all the *Chalk-pits* of *Kent*, *Surrey*, *Essex*, *Hartfordshire*, *Barkshire*, *Oxfordshire*, and all others that I have search'd; being found indifferently in the *Beds* of *Chalk* from the *top* quite down to the *bottom* of the *Pit*; I having my self commonly observed them to the very *bottom* of all, in *Pits* that were an *hundred foot deep*, and in *Wells* much deeper. To conclude, those *Shells*, and other *Bodies*, that were *still lighter* than *these*, and consequently *lighter* than *Stone*, *Chalk*, and the other *common Matter* of the *Earth*;

Earth, such as the Shells of Lobsters (which are but as $1\frac{1}{3}$ to 1) of Crabs, ($1\frac{1}{4}$ to 1) and the rest of the *Crustaceous* kind: the Teeth and Bones of the cartilaginous and squammose Fishes, and many other Bodies, these I say would of Course *subside* last of all, and so, falling above the rest, be lodged *near*, if not *upon* the Surface; where being continually exposed to *Weather*, and other *Injuries*, they must in tract of time needs *decay* and *rot*, and at last quite *vanish* and *disappear*; and 'tis not to me any great *Wonder*, that at *this distance* of four thousand years, we find so *very few* of them remaining. So that I think I may now safely appeal to any ingenuous and impartial Looker on, whether this, [*That we find all those kinds of Shells (now extant upon our Shores) which have nearly the same Gravity with Stone, and the other ordinary Matter of our Earth, that is so tight and compact as to preserve them, enclosed in great plenty therein, and only those, the rest which are lighter being so very rarely found*] can reasonably be supposed to have happened by *meer chance*, with this *Constancy* and *Certainty*, and that in so many and distant Places:

Places: as also, whether *this* be any *Objection* against my *Hypothesis*: or rather be not the *strongest* necessary *Confirmation* of it that could well be expected, or even desired.

To this *Dissertation* I shall subjoin an *Appendix*, which will consist of several *Sections*, touching the *Bodies* called *Unicornu Fossile*, *Lapis Judaicus*, *Entrochus*, *Asteria*, or the *Star-stone-Columns*: with some farther *Reflections* upon the *Busonites*, *Glossopetra*, and *Cornu Ammonis*; proving that *these*, and several more, which have been (for many *Ages*) reputed *Gemms*, and meer *Stones*, are really nothing else but the *Teeth*, *Bones*, and other *Parts of Sea-Animals*, and (as the rest were) left behind by the *Universal Deluge*.

PART

PART I.

An Examination of the Opinions of former Writers on this Subject. The Means whereby they thought these Marine Bodies brought out upon the Earth. Of certain Changes of Sea and Land, and other Alterations in the Terraqueous Globe, which they suppose to have happened.

THIS so considerable a Point being thus gained: the *Legitimacy* or *Reality* of these *Marine Bodies* vindicated and asserted: and my Way so far effectually cleared by the foregoing *Dissertation*; I now re-assume my *original Design*, and pass on to enquire by what *Means* they were hurried out of the *Ocean*, the place of their *native Abode*, to *dry Land*, and even to *Countries* very remote from any *Seas*.

It is indeed a *Question* of great *Antiquity*:

quity : and which hath, for many *Ages*, given no small *Fatigue* to *Learned Men*. Nor hath the *present* been less inquisitive into this *Affair* than the *former Ages* were. We have seen several Hands employed herein : and many of them very excellent ones too. The great number of the *Undertakers*, the *Worth* of some of them, and their *Zeal* to bring the Matter to a Decision, are sure *Arguments* of the *Dignity* and *Importance* of it : and that it is not hitherto decided, is as certain a proof of its *Difficulty*.

Some were of Opinion, that these *Shells* were fetch'd from *Sea*, by the *ancient Inhabitants* of those Countries where they are now found ; who, after they had used the included *Fishes* for Food, *flinging forth* the *Shells*, many of them became *petrified*, as they speak ; being thereby preserved down to our times, and are the same which we at this day find in our *Fields* and *Quarries*.

Others rather thought that they were only *Reliques* of some former great *Inundations* of the *Sea* ; which, furiously rushing forth, and *overflowing* the adjacent Territories, bore these
Bodies

Bodies out upon the *Earth* along with it: but returning at length more leisurely and calmly back again, it left them all *behind*.

Many were of Opinion, that the *Sea* frequently flitted and *changed* its Place: that several parts of the *Globe* which are now *dry Land*, and habitable, lay heretofore at the *bottom* of the *Sea*, and were covered by it: that particularly the very *Countries*, which present us with these *Spoils* of it, were *anciently* in its possession; being then an Habitation of *Sharks* and other *Fishes*, of *Oysters*, *Cockles*, and the like; but the *Sea*, in tract of time, *retreating* thence, and betaking it self into *new Quarters*: gaining as much ground on the *opposite Coasts*, as it lost upon *those*, left these *Shells* there as Marks of its *ancient Bounds* and *Seat*.

Amongst the rest there were indeed some who believed *these* to be *Remains* of the *General Deluge*: and so many Monuments of that calamitous and fatal *Irruption*. These last assuredly were in the *right*; but the far greater part of them rather *asserted* than *proved* this: rather deliver'd it as their

Opinion, than offered any *rational Arguments* to induce *others* to the same *Belief*. And for the *rest*, who did offer any, so *unhappy* were they in the *Choice*, and *unsuccessful* in the *Management* of them, by reason of the *Shortness* of their *Observations*, and their not having duely informed themselves of the *State* of these *Things*, that none of the other *Partizans* appeared with less *Applause*, none less strenuously maintained their *Ground*, than *these* did.

The *Truth* is, as Matters were ordered amongst them, no Man could receive much *Light* or *Satisfaction* from what was advanced by any of them. They little more than clashed with one another: each could demolish the others *Work* with ease enough, but not a Man of them tolerably defend his *own*; which was sure never to outstand the first *Assault* that was made. Yea upon so equal *Terms* did they all stand, that no one could well lay claim to a larger share of *Truth* for his side: no one had a fairer pretence of *Right*, than the rest. And, it being impossible to imagine that *all* could be in the *Right*, some *Learned Men*

Men began to suspect that none of them were so.

These thereupon laid out on all Hands for some new *Expedient* to solve and put an end to the *Perplexity*. And 'twas this *last Effort* that brought forth the *Opinion*, that these *Bodies* are not what they seem to be: that they are *no Shells*, but meer *Sportings* of active *Nature* in this *subterraneous Kingdom*, and only *Semblances* or *Imitations* of *Shells*. They imagined that this *shortned* the *Difficulty*, because it spared them the *Trouble* of accounting for their *Conveyance* from *Sea*, which was what had so severely exercised all the former. Though in reality, this only *heightened* and *enhanced* it: and render'd it still more *intricate*; as does in some Measure already, and will hereafter appear more at large, when I shall have published the *preliminary Dissertation*, whereof I have given some Account above. And *this* was the *most received* and *prevalent Opinion* when I first brought my *Collection* of these *Things* up to *London*.

There have been, besides these recited, some *other Conjectures* proposed

about the removal of these Bodies to Land; which I choose, rather than trouble the *Reader* with a detail of them here, to defer to their proper place, that I may proceed directly onwards in my *Design*. Now the more effectually to smooth my *Way*: and that this very great *diversity* of *Opinions* may not be any longer an Amusement to the *World*, 'twill be very convenient that I look into the *Reasons* and *Pretensions* of each: and shew upon what *Ground* 'tis that I embrace that of the *Deluge*, and set aside *all the rest*.

Why I adhere to them who suppose these *Marine Productions* brought out by the *Universal Deluge*, will be best learn'd from the *succeeding Part* of this *Essay*, which is wholly dedicated to that purpose. And to that I shall prefix, An *Historical Account* of the *Labours* of *Fab. Columna*, *Nic. Steno*, *P. Boccone*, *Jac. Grandius*, *Mr. John Ray*, and other *Learned Men*, on this *Subject*; shewing what they have *already done* in it, wherein they *failed*, and what remains *still to be done*.

Why I *reject* all the other *Conjectures*, falls under our *present Consideration*.

deretion. And to make as *short* of the Matter as possible, 'tis because they will none of them abide the *Test*. Because they have not due warrant from *Observation*, but are clearly repugnant thereunto. In a word, because the *present Circumstances* of these *Marine Bodies* do not square with *those Opinions*, but exhibit *Phænomena* that *thwart* them, and that give *plain Indications* that they could never have been put into the *Condition* we now find them by any such *short and partial Agents* as *those* they propose.

Now in regard that the *said Circumstances* are impartially related in my *Observations*, we need only have recourse to *them* to put an *End* to this *Business*. For, as *Mathematicians* say of a *streight Line*, that 'tis as well an *Index* of its own *Rectitude*, as of the *Obliquity* of a *crooked* one; so *these* may serve indifferently to detect the *erroneous ways*, and to point forth the *true*. And it is from these *Observations*: from the *Number*, *Order*, *Variety*, *Situation*, *Depth*, *Distance* from the *Sea*, and other *Accidents* of these *Bodies*, that I shall shew

1. That *they* were not brought from *Sea* to the *Parts* where they are now found, by *Men*, the *ancient Inhabitants* of those *Parts*, as *some Authors* have been of *Opinion*; they presuming that these *Shells* were at first only flung out upon the *Surface* of the *Earth*: and that those which we now find *buried* in it, were, in tract of time, *covered*, either by that *Terrestrial Matter* which falls down along with *Rain*, or by the *Earth* which is wash'd from off the *Hills* by *Land floods*.
2. That *they* were not *carry'd*, together with the *Water* which some suppose to pass continually from the bottom of the *Sea*, to the *Heads* of *Springs* and *Rivers*, through certain *subterranean Conduits* or *Channels*, until they were by some *Glut*, *Stop*, or other means arrested in their *Passage*, and so detain'd in the *Bowels* of the *Earth*; as *others* have rather inclined to believe.
3. That *they* were not *born forth* of the *Sea*, and laid upon the *Land* by particular *Inundations*; such as were the *Ogygean*, the *Deucalionean*, and others of fresher date: such as are *those* which usually attend *Earth-quakes*: or those which are sometimes occasioned

occasioned by very high *Tides*, by impetuous *Winds*, and the like; as *other Writers* have thought.

4. That *they* were not left behind at the *beginning* of the *World*, when the *Sea* overspread the *whole Globe*, till its *Retreat* into its assigned *Chanel*, and the *Waters* were gathered together unto one place, * the third day from the *Gen. i. 9. Commencement of the *Creation*; which *others* believed.

5. That *they* were not left by the *Seas* being constrained to *withdraw* from off certain *Tracts* of *Land*, which lay till then at the *Bottom* of it, but being *raised* to an higher pitch, so as to surmount the *Level* of the *Seas* surface, they, by that means, became *Islands* and *habitable*; the said *Tracts* being thus elevated by *Earthquakes*, or the like subterraneous *Explosions*; in such manner as *Rhodes*, *Thera*, *Therasia*, and many other *Islands* were supposed to have been raised; which is the *Conjecture* of *others*.

6. That *they* were not left by the *Seas* changing its *Place*, receding from the *Parts* it *anciently* possessed, and betaking it self to new *Quarters*: this *Change* being occasion'd by some accidental *Emotion*.

tion or *Transposition* of the common *Center* of *Gravity* in the *Terraqueous* *Globe*; and thereupon the *Fluids* of it, the *Sea*, and the rest, immediately *shifting* likewise, as being the more easily moveable parts of the *Mass*, and coming to another *Equilibrium*, that they might thereby the better accommodate themselves to their *new Center*; As others.

7. That *they* were not left upon the *Seas* being *protruded* forwards, and constrained to *fall off* from certain *Coasts*, which it formerly possessed, by the *Mud* or *Earth* which is discharged into it by *Rivers*; the said *Mud* being reposed along the *Shores* near the *Ostia* of those *Rivers*, and by that means making continual *Additions* to the *Land*, thereby *excluding* the *Sea*, daily invading and *gaining* upon it, and preserving these *Shells* as *Trophies* and *Signs* of its *new Acquests* and *Encroachments*; which *Others* have imagined; they concluding that the *Islands Echinades*, the *Lower Egypt*, *Thessaly*, and many other *Countries*, were thus raised out of the *Mud* brought down by *Achelous*, the *Nile*, *Peneus*, and other *Rivers*. Lastly.

Lastly. That *they* were not left by the Sea's continual *flitting* and *shifting* its *Chanel*: this *Progression* being occasioned by the Sea's *wearing* and *gaining* upon *one Shore*, and flinging up *Mud*, and, together with it, these *Shells*, upon the *other*, or opposite *Coasts*, thereby making perpetual *Additions* unto them; which is the *Opinion* of other *Authors*.

These *Propositions* (which are no other than so many *Conjectaries* drawn from the *Observations*) are, we see, all *Negative*; as being directed against the *Mistakes* of some who have formerly engaged in this *Research*. The *Ways* they have taken to account for the *Conveyance* of these *Marine Bodies* to *Land*, are very many, as well as *different* from each other. For so *eager* and *sollicitous* hath the *inquisitive* and *better* part of *Mankind* been to bring this Matter to a fair *issue* and *determination*, that no *Stone* hath been left unturned, no way, whereby these things could ever possibly have been brought forth of the *Sea*, but one or other of them hath pitch'd upon it. So that by this *Refutation* of all these, I might prove my *own* (which

(which is the only one remaining) by *Induction*; but this kind of *Proof* is not needful, where more *cogent* and *positive Arguments* are not wanting.

And thus much of *this Part* I get over by the sole guidance of my *Senses*. A *View* of the *present State* of these *Bodies* alone convinced me sufficiently that the *Means*, proposed by *these Authors*, were not the *true ones*: that they were both *levell'd wide*, and fell all *short* of the *Mark*. Now though this was enough for my present purpose; and when I had evinced that, although such *Alterations*, as those which *these Gentlemen* suppose: *Transitions*, and *Migrations* of the *Center of Gravity*: *Elevations* of new *Islands*: whole *Countries* gained from the *Sea*: and other like *Changes* had *actually* happened, yet these *Shells* could never possibly have been *reposed* thereby in the manner we now find them: I say, when I had proved *this*, I was not immediately concerned to enquire whether such *Alterations* had really ever happened or not. Yet, partly for a fuller and more effectual *Disproof* of the recited *Opinions*: and partly because I am more especially obliged by my *general*

neral Design to look into all Pretences of *Changes* in the *Globe* we inhabit, and I saw very well that scarce *any*, of all these alledged, had the least countenance either from the *present Face* of the *Earth*, or any credible and authentick *Records* of the *ancient State* of it, I resolved to pursue this Matter somewhat *farther*, and to shew that, although there do indeed happen some *Alterations* in the *Globe*, yet they are very *slight* and almost *imperceptible*, * and such as tend rather to the *Bene-* * Part 5.
fit and *Conservation* of the *Earth* and Conf. 1. &c.
its *Productions*, than to the *Disorder* and *Destruction* both of the *one* and the *other*, as all these *supposititious ones* most manifestly would do, were there really any such. But from clear and incontestible *Monuments* of *Antiquity*: from *History* and *Geography*: and from attentive *Consideration* of the *present State* of those *Countries* where these *Changes* were supposed to have been wrought, I prove that they are *imaginary* and *groundless*, and that *such* in earnest never happened; but that the *Bounds* of *Sea* and *Land* have been more *fix'd* and *permanent*: and in short, that the *terra-*
queous

queous Globe is to *this day* nearly in the same *Condition* that the *Universal Deluge* left it: being also like to *continue* so till the *Time* of its final *Ruin* and *Dissolution*, preserved to the same *End* for which 'twas first *formed*, and by the same *Power* which hath *secured* it hitherto. But, with respect to my *present Design*, I more particularly make out,

That although *Rain-water* be indeed (as these *Writers* suppose) very plentifully *saturated* with *terrestrial Matter*, and (as I shall make appear) that *peculiar Matter* out of which the *Bodies* of *Vegetables*, and consequently of *Animals*, are *formed*, *nourished*, and *augmented*, *Water* being the common *Vehicle* and *Distributor* of it to the *Parts* of those *Bodies*, and all *Water* (especially that of *Rain*) being, more or less, *stored* with this, it being *light* in comparison of the common *mineral earthy Matter*, and therefore easily assumed into *Water*, and *moved* along with it; yet that this *Matter* being all originally derived from the *Surface* of the *Earth*, either by the *Vapour* that continually *issues* out, and *ascends* from all parts of it, † or *wash'd* off

† Part 3.
Sect. 1.
Conf. 8.

off by *Land-floods*, and conveyed into *Rivers* and the *Sea*, and thence *elevated* up, together with the *Vapour*, which, as the former, constitutes the *Rain* that falls: I say, it being thus *originally* all *rais'd* from the *Earth*, when *restored back* again thereunto, 'tis but where it was *before*, and does not *enlarge* the *Dimensions* of the *Globe*, or *augment* the *Surface* of the *Earth*, and only lye idly and unserviceably there, but *Part* of it is *introduced* into the *Plants* which grow thereon, for their *Nutrition* and *Increment*, and the *rest*, which is superfluous, either *remounts* again, with the ascending *Vapour*, as before, or is wash'd down into *Rivers*, and transmitted into the *Sea*, and does not make any sensible *Addition* to the *Earth* as *Some* have believed.

That the *terrestrial Matter*, which is thus carried by *Rivers* down into the *Sea*, is *sustained* therein, partly by the greater *Crassitude* and *Gravity* of the *Sea-water*: and partly by its constant *Agitation*, occasioned by the *Tides*, and by its other *Motions*; and is not permitted to *sink* to the *bottom*. Or, if any of it do, 'tis *rais'd* up again
by

by the next *Storm*: and being *supported* in the *Mass* of *Water*, together with the rest, 'tis by degrees *exhaled*, mounted up with the *Rain* that *rises* thence, and returned back again to the *Earth* in fruitful *Showers*. By this perpetual *Circulation* a vast many Things in the *System* of *Nature* are transacted: and two main *Intentions* of *Providence* constantly promoted; the one a *Dispensation* of *Water* promiscuously and indifferently to all *Parts* of the *Earth*; this being the immediate *Agent* that both *bears* the *constituent Matter* to all formed *Bodies*, and, when brought to them, *insinuates* it in, and *distributes* it unto the several *Parts* of those *Bodies*, for their *Preservation* and *Growth*: the other, the keeping a just *Æquilibrium*, if I may so say, betwixt the *Sea* and *Land*; the *Water*, that was raised out of the *Sea*, for a *Vehicle* to this *Matter*, being by this means *refunded back* again into it, and the *Matter* it self restored to its original *Fund* and *Promptuary*, the *Earth*; whereby each is *restrained*, and kept to due *Bounds*; so that the *Sea* may not *encroach* upon the *Earth*, nor the *Earth* gain Ground of the *Sea*. That there

there never were any *Islands*, or other considerable parcels of *Land*, amassed or heap'd up: nor any *enlargement*, or Addition of Earth made to the *Continent*, by the *Mud* that is carried down into the Sea by Rivers. That although the *Ancients* were almost unanimously of Opinion that those Parts, where *Egypt* now is, were formerly *Sea*: and that a very considerable portion of *that Countrey* was *recent*, and formed out of the *Mud* discharged into the neighbouring Sea by the *Nile*; yet this tract of Land had no such *Rise*, but is as *Old*, and of as long a Standing, as any upon all the whole Continent of *Africa*: and hath been in much the same *Natural Condition*, that it is at *this Day*, ever since the time of the *Deluge*; its *Shores* being neither advanced one jot further into the *Sea* for this three or four thousand Years, nor its *Surface* raised by additional *Mud* deposed upon it by the yearly *Inundations* of the *Nile*. That neither the *Palus Maotis*, nor the *Euxine*, nor any other *Seas*, fill up, or by degrees grow shallower. That *Salmydessus*, *Themiscyra*, *Sidene*, and the adjacent Countries, upon the Coasts of the *Euxine*

E Sea,

Sea, were not formed out of the *Mud* brought down by the *Ister*, *Thermodon*, *Iris*, and the other Rivers which discharge themselves into *that Sea*. That *Theffaly* was not raised out of the *Mud* born down by the River *Peneus*: the Islands *Echinades*, or *Curzolari*, out of that brought by the River *Achelous*: *Cilicia*, by the River *Pyramus*: *Mysia*, *Lydia*, *Ionia*, and other Countries of *Anatolia*, by the *Caicus*, *Hermus*, *Cayster*, and the other Rivers which pass through them. To be short, That no *Island* or *Country* in the *whole World* was ever raised by *this means*, notwithstanding that very many *Authors*, and some of considerable Note, have believed that all the abovementioned *Countries* were so raised. Nay, to so strange a height of Extravagance do some, otherwise Learned and Curious Persons run, when they indulge *Fancy* too far, and rely wholly upon *Probabilities* and *Conjectures*, there is hardly any one single *Island* or *Country* all round the *Globe*, that one *Writer* or other hath not thought to have been formed after this manner, or at least, some very *large Part* of it.

That there is no *authentick Instance*
of

of any considerable *Tract* of *Land* that was *thrown* up from the *Bottom* of the *Sea*, by an *Earthquake*, or other subterranean *Explosion*, so as to become an *Island*, and be render'd *habitable*. That *Rhodus*, *Thera*, *Therasia*, and several other *Islands*, which were supposed by the *Ancients*, and, upon their *Authority*, by *later Authors*, to have been thus *raised*, had really no such *Original*: but have *stood out* above *Water* as long as the rest of their *Fellow Islands*, and stand now just as the *Universal Deluge* left them.

That as to that *Affection* of *Bodies* which is called their *Gravity*, it clearly surpasses all the *Powers* of meer *Nature*, and all the *Meckanism* of *Matter*. That as any one *Body*, or *Part* of *Matter*, cannot be the *Cause* of its own *Gravity*: so no more can it ever possibly be the *Cause* of the *Gravity* of another *Body*, or *part* of *Matter*. That neither the *Earth's* diurnal *Revolution* upon its *Axis*: Nor any *magnetick Effluvia* of the *Earth*: Nor the *Air*, or *Atmosphere* which environs the *Earth*: Nor the *Æther*, or *Materia subtilis* of the *Cartesians*, in what manner soever *moved* or *agitated*: (all which have
E 2 been

been proposed by several *Learned Men* as the *Causes* of *Gravity*) nor any other *Fluid* or *Matter* whatever, can of it self produce such an *Effect* as is that of the *Gravity* of *Bodies*. That it does not proceed from the *Efficiency* of any such *contingent* and *unstable Agents*, but stands on a *Basis* more *firm* and *stedfast*; being intirely owing to the direct *Concourse* of the *Power* of the *Author of Nature*, immediately in his *Hand*, and the *main Engine* whereby this stupendous *Fabrick* of the *Universe* is *managed* and *supported*: the *prime Hinge* whereon the whole *Frame* of *Nature* moves: and is *principally concerned*, if not the *sole Efficient* in the most remarkable *Phænomena* of the *Natural World*; which, should *Gravity* once *cease*, or be *withdrawn*, would instantly *shiver* into *Millions* of *Atoms* and fall into the greatest *Disorder* and *Confusion*. That the common *Center* of *Gravity* in the *terrestrial Globe* is *steady*, *immovable*, and not liable to any accidental *Transposition*: nor hath it ever *shifted* or *changed* its *Station*. And that there is no *Declination* of *Latitude*: nor *Variation* of the *Elevation* of the *Pole*; notwithstanding

ing what some *Learned Men* have asserted.

What concerns the raising of *new Mountains: Deterrations*, or the *Devolution* of *Earth* down upon the *Valleys*, from the *Hills* and higher *Grounds*: and *Islands* torn off from the main *Continent* by *Earthquakes*, or by the furious and impetuous *insults* of the *Sea*; these, I say, will fall more properly under our Consideration on another Occasion *. And for the *Muta-* * Part 2.
tions of lesser moment, which some and
 have fancied to have happened within Part 5.
 this *Intervall*, I mean, for the last four thousand Years since the Deluge, I chuse rather to pass them over at present, than to crowd and encumber this *short Tract* with the account of them.

I must needs freely own, that when I first directed my Thoughts *this way*, 'twas matter of real Admiration to me, to find that a Belief of *so many*, and such *great Alterations* in the *Earth*, had gained so large footing, and made good its ground so *many Ages*, in the *World*; there being not the least signs nor footsteps of any such thing upon the face of the *whole Earth*: no tolerable *Foundation* for such a Belief ei-

ther in *Nature* or *History*. But I soon saw very well, that the *Moderns* generally entertained it meerly upon the Credit and Tradition of the *Ancients*, and that without due Examination, or Enquiry into the *Truth* and *Probability* of it. And 'twas not long e'er I discovered what it was that so generally misled the *Ancients* into these *Mistakes*. But of that more by and by.

Those *ancient Pagan Writers* were indeed very much *excusable* as to this matter. *Philosophy* was then again in its *Infancy*; there remaining but few marks of the old *Tradition*, and those much obliterated and defaced by *Time*. So that they had only dark and faint *Idea's*, narrow and scanty *Conceptions* of *Providence*: and were ignorant of its *Intentions*, and of the *methods* of its *Conduct* in the Government and Preservation of the *Natural World*. They wanted a longer *Experience* of *these things*: a larger stock of *Observations*, and *Records* of the *State* of the *Earth* before their *Times*; having, as things then stood, nothing to assist them in their *Enquiries* besides their own *Guesses* and *Fancy*. For their
Progenitors,

Progenitors, and those who had lived in the *earlier Ages*, were almost entirely taken up with *Business* of another kind. That fatal Calamity, the *Deluge*, had wrought such a *Change*, *that they beheld every where a new* *Part 2.* *Face* of things: and the *Earth* did not then teem forth its *Encrease*, as formerly, of its own accord, but required *Culture*, and the *Assistance* of their Hands, much more than before it did. The Provision of Bread for Food: *Clothing* to ward off the *Injury* and *Inclemency* of the *Air*: and other like *Employs* for the *Comfort* and *Support* of *Life*, being of indispensable necessity, were to be first look'd after. And these *Employs*, being then for the most part new to them, and such as they were unskill'd in, were alone enough to take up the greatest part of their Time. The *Methods* they used of *Agriculture*, and other *Arts* of like Importance, were so awkward and tedious, as to afford them little *leisure* for *Works* of the *Brain*, for *History*, or *Contemplations* of that nature. And till better *Experience* had led their *Posterity* to the *Improvements* of *Arts*: till the *Plow*, and other useful *Instruments*,

ments, were found out : and they had learn'd more compendious and expeditious ways of dispatching those *Affairs*, whereby they *shortned* their *Labours*, and so *gained time*, there was no *shew* of *Learning*, or Matters of Speculation among them ; and we hear little or nothing of *Writing*, nay 'twas a very considerable time before *Letters* themselves were found out. I know very well, there are some who talk of *Letters* before the *Deluge* ; but that is a matter of meer *Conjecture*, and I think nothing can be peremptorily determined either the one way or the other ; though I shall shew, that 'tis highly *probable* they had *none*. Be *that* how it will, I shall plainly make out, that the *Ages* which next succeeded the *Deluge* *had none*. So far from it, that they knew nothing at all of them : and the *first Writing* they used was only the simple *Pictures*, and *Gravings* of the *Things* they would *represent*, Beasts, Birds, and the like ; which way of Expression was afterwards called *Hieroglyphick*. But *this* fell into *disuse*, when *Letters* were afterwards *discovered* ; they being, in all respects, a far more

more *excellent* and noble *Invention*. We see therefore that there were several *Reasons* why those *early Ages* could not transmit Accounts of the *State* of the *Earth* and of these *Marine Bodies*, in *their Times*, down to the *succeeding Generations*. So that *these* having little more to trust to than their *own Imagination*, and no surer a *Guide* in their *Reasonings* about *these Things* than *bare Conjecture*, 'twas no wonder that they fell into gross and palpable *Mistakes* concerning them.

Nor much more wonder is it that *Epicurus* who could ever espouse a *Notion* so enormously absurd and groundless, as that the World was framed by *Chance*: that this vast, regular, and most stupendous *Pile* was owing to no higher a *Principle* than a *fortuitous Congress of Atoms*: and that either there was no *God* at all, or, which is much the same thing, that he was an impotent and lazy *Being*, and wholly without *Concern* for the *Affairs* of this *lower World*; I say, 'tis in no wise strange that such a one should believe, as he did, that *Things* were blindly shuffled and hurled about in the *World*: that the *Elements* were

were at constant *Strife* and *War* with each other: that in some places, the *Sea* invaded the *Land*: in others, the *Land* got ground of the *Sea*: that *all Nature* was in an *Hurry* and *Tumult*: and that as the *World* was first made, so should it be again *dissolved* and *destroyed* by *Chance*: that it had already made large *Advances* that way, being *infirm* and *worn* with *Age*, shattered and *crazy*, and would in time dwindle and relapse again into its *original Chaos*.

Did *Gravity*, the Inclination of *Bodies* towards the same common *Center*, to which Inclination they owe their respective *Order*, and *Site* in regard of each other, very many of their *Motions* and *Actions*, and in a great measure, their present *Constitution*; did *this*, I say, happen from so contingent, precarious, and inconstant *Causes* as many have believed: or did it stand upon so ticklish and tottering a *Foundation* as some Mens Fancy hath placed it, 'twould be no wonder should it frequently *vary*: its *Center* swerve and *shift*, upon every turn: and that there should ensue thereupon, not only such *Motions* and *Alterations* of the
Bounds

Bounds of the *Sea* as they imagine; but likewise many other, and not less pernicious, *Perturbations* of the course of even *universal Nature*.

Or was the *Universe* left to its own *Conduct* and *Management*: the whole *Mass* of created *Matter* to its proper *Disposition* and *Tendency*: were there no restraint of *Bounds* to the *Earth*, nor *Curb* to the *Fury* of the *Ocean*: was there not *One* who had set bars and doors to it, and said hitherto shalt thou come, but no farther, and here shall thy proud *Waves* be staid *; then indeed * Job. xxxviii. 10, 11. might we well expect such *Vicissitudes* and *Confusions* of Things: such *Justlings* and *Clashings* in *Nature*: such *Depredations*, and *Changes* of *Sea* and *Land*.

But if the same mighty *Power*, which in the *Beginning* produced this vast *System* of *Bodies* out of *Nothing*, and disposed and ranged them into the most excellent and beautiful *Order* we now behold: which at first framed an *Earth* of a *Constitution* suitable to the *innocent State* of its *primitive Inhabitants*: and afterwards when *Man* had *degenerated*, and quitted that *Innocence*, altered that *Constitution* of the *Earth*

* Part 2.
Conf. 2. &c.

Earth, by means of the *Deluge* *, and reduced it to the *Condition* 'tis now in, thereby adapting it more nearly to the *present Exigencies* of things, to the *laps'd* and *frail state* of *humane Nature*; If that same *Power* be yet at the *Helm*: if it *preside* in the *Government* of the *Natural World*: and hath still the same peculiar *Care* of *Mankind*, and, for *their sake*, of the *Earth*, as heretofore, (all which shall be evidently made out,) then may we very reasonably conclude 'twill also *continue* to *preserve* this *Earth*, to be a convenient *Habitation* for the *future Races* of *Mankind*, and to furnish forth all things necessary for their *Use*, *Animals*, *Vegetables*, and *Minerals*, as long as *Mankind* it self shall endure; that is, till the *Design* and *Reason* of its *Preservation* shall cease. And till then, so *steady* are the *Purposes* of *Almighty Wisdom*: so firm, establish'd, and constant the *Laws*, whereby it *supports* and *rules* the *Universe*; the *Earth*, *Sea*, and all *natural Things* will continue in the *State* wherein they now are, without the least *Senescence* or *Decay*: without *farring*, *Disorder*, or *Invasion* of one another: without In-
version

version or Variation of the ordinary Periods, Revolutions, and Successions of things: and we have the highest security imaginable, that *While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night shall not cease.* *

*Gen.viii.

22.

And whatever may be urged in behalf of the *Ancients*, I cannot well see, I confess, what can be said for the *later Authors*, who have embrac'd the *same Tenets*, more than that these Learned Men took up those Tenets *on Trust*; their over-great deference to the Dictates of *Antiquity* betraying them into a persuasion of such *Changes* in the *Earth*. I have given my *Reasons* above why I cannot think the *Ancients* competent *Judges* in this *Case*. We have, at this time of day, better and more certain *Means of Information* than *they* had; and therefore it were to have been wish'd that these Gentlemen had not thus obsequiously followed *them*, but gone another way to work. It would certainly have been much better, had they taken the pains to have look'd a little into *Matter of Fact*: had they consulted *History* and *Geography*, in order duly to acquaint

quaint themselves with the *past* and *present State* of the *terraqeous Globe*; and not to have pass'd *Sentence* till they had first compared the most *ancient Descriptions* of *Countries* with the *Countries themselves* as *now* they stand. Nay, had they but read and attended to the *Accounts* which the very *Authors*, from whom they borrow these *Opinions*, have left us, they might have discovered, even from *them*, the *Errors* and *Oversights* of their *Authors*: and have learn'd, that the *Face* of *Sea* and *Land* is the very *same* at *this Day* that it was when those *Accounts* were compiled: and that the *Globe* hath not sustained any considerable *Alterations*, either in the *Whole* or any of its *Parts* in all this time.

Those who can content themselves with a *Superficial View* of *Things*: who are satisfied with contemplating them in *Gross*: and can acquiesce in a general, and less nice *Examination* of them: whose *Thoughts* are *narrow* and *bounded*: and their *Prospects* of *Nature* scanty, and by piecemeal, must needs make very *short* and defective *Judgments*, and, oftentimes very *erroneous*, and wide of Truth. Some
fanciful

fanciful Men have expected nothing but *Confusion* and *Ruin* from those very means whereby both *that* and *this* is most effectually prevented and avoided. One imagines that the *terrestrial Matter*, which is showered down along with *Rain*, enlarges the *Bulk* of the *Earth*, and that it will in time bury, and lay all things under ground. Another, on the contrary, fancies that the *Earth* will e'er long all be wash'd away by *Rains*, and born down into the *Sea* by *Rivers*; and, its *Chanels* being thereby quite filled up, the *Waters* of the *Ocean* will be turned forth to overwhelm the dry *Land*. Whereas by this *Distribution* of *Matter*, continual *Provision* is every where made for the *Supply* of *Bodies*: the just *State* of *Sea* and *Land* preserved, and the *Bounds* of each secured; quite contrary to the preposterous *Reasonings* of those Men, who expected so different a *Result* of these things. And should this *Circulation* (from which they dreaded those dismal *Consequences*) once cease, the *Formation* of *Bodies* would be immediately at an *End*: and *Nature* at a perfect *Stand*. But I am aware that I transgress: and that this

this is a *Prolixity* not allowable in a *Treatise* of this nature; wherefore I shall *conclude*, after I have performed my *Promise* of discovering what it was which led the *ancient Historians*, *Geographers*, and others so generally into a belief of these frequent *Changes* betwixt *Sea* and *Land*; and 'twas *this*.

They observed, almost wherever they cast their eyes, vast *Multitudes* of *Sea-shells*, at *Land*, in their *Fields*, and even at very great *distance* from any *Sea*. This, *Eratastheneſes*, *Herodotus*, *Xanthus Lydus*, *Strabo*, *Pausanias*, *Pomponius Mela*, *Theophrastus*, *Strato* the Philosopher, *Plutarch*, and others of them assure us. They found them upon the *Hills*, as well as in the *Valleys* and *Plains*: they observed that they were immerſed in the *Maſs* of the *Stone* of their *Rocks*, *Quarries*, and *Mines*, in the ſame manner as they are at this day found in all known *Parts* of the *World*.

Nay in thoſe *Elder Times*, and which were ſo much *nearer* to the *De-luge* than ours are, they found theſe *Marine Bodies* more *frequently*, and in much *greater plenty* than we *now* do:

do: and most, if not all of them, *fresh, entire, and firm.* The whole *crustaceous Kind*, and the *lighter ones* of the *testaceous*, which together would be a *vast number*, subsiding last, fell upon the *Surface* of the *Earth*; * whilst * Pag. 29; &c. *supra*, and Part 2: Conf. 3. the *heavier* which settled down before, were entombed in the *Bowels* of it.

Those therefore must *then* lye everywhere strewed upon the ground. Whereas *now* very few, if any, of them appear; † the *Shells* which we find † Conf. p. 8. and Part. 2. Con. 3. at *present* upon the face of the *Earth* being principally of the *heavier sorts*, which were at *first* lodged *within* it, and *since* disclosed and turned out; by what Means we shall see hereafter ||. || Part 5: Conf. 4. And indeed, 'tis not conceivable how the generality of them could *endure* so many *Hundreds of Years* as have since past: how they could lye so long exposed to the *Air, Weather*, and other *Injuries*, without vast numbers of them, and especially the finer and tenderer Species, being, long e'er this, *perish'd and rotten*: some of them quite *destroy'd and vanish'd*, and the rest so *damaged*, many of them, and *altered* by *Time*, as not to appear the things they then were, and so create a doubt

amongst some of *us* whether they are really *Shells* or not.

This was a *Scruple* that never entered into *their Heads*. The *Shells*, being then fair, *sound*, and free from decay, were so exactly like those they saw lying upon their *Shores*, that they never made any question but that they were the *Exuvia* of *Shell-fish*: and that they once belonged all to the *Sea*. But the *Difficulty* was how they came *thither*: and by what means they could ever arrive to *Places* oftentimes so remote from the *Ocean*.

The *Ages* that went before knew well enough how these *Marine Bodies* were brought thither. But such were the *Anxieties* and *Distresses* of the then again *infant World*: so incessant their *Employs* about Provision for *Food*, *Rayment*, and the like, that (even after *Letters* were discovered) there was little *leisure* to commit any thing to *Writing*; and, for want thereof, the memory of this extraordinary *Accident* was in great measure worn out and lost. 'Tis true there was a general and loud *Rumour* amongst them of a mighty *Deluge* of Water that had drowned all *Mankind*, except only
a very

a very few *Persons*. But there had also happened very terrible *Inundations* of later *Date*, and which were nearer to the *Times* when these *Authors* lived. Such was that which overflowed *Attica* in the days of *Ogyges*: and that which drowned *Thessaly* in *Deucalion's* time. These made cruel *Havock* and *Destruction* amongst them: their own native *Country*, *Greece*, was the *Theatre* whereon these *Tragedies* were acted and their *Progenitors* had seen and felt their *Fury*. And these happening nearer home, and their *Effects* being fresh, and in all *Mens* mouths, they made so sensible and lasting *Impressions* upon their *Minds*, that the old great *Deluge* was eclipsed by that means, its *Tradition* mightily obscured, and the *Circumstances* of it so interwoven and confounded with those of these late *Deluges*, that 'twas e'en dwindled into nothing, and almost buried in the *Relations* of those *Inundations*.

In their *Enquiries* therefore into this *Matter*, scarcely a *Man* of them thought, or so much as dream'd, of the *Universal Deluge*. They concluded indeed unanimously, that the *Sea*

had been *there*, wherever they met with any of these *Shells*: and that *it* had left them behind. And so far they were in the *right*: *this* was an *Inference* rational and natural enough. But when they began to reason about the *Means* how the *Sea* got thither, and away back again, *there* they were perfectly in the dark. And, both *Tradition* and *Philosophy* failing them, they had recourse to *Shifts*, and to the best *Conjectures* they could think of; concluding that *it* was either forced forth, as in *particular Inundations*, such as those lately mentioned: or that *those Parts*, where they found the *Shells*, had been *formerly* in the *Possession* of the *Sea*, and the place of its natural *Residence*, which it had since quitted and *deserted*.

Upon *this* they began to seek out by what *Means*, most probably, the *Sea* might have been *dispossessed* of those *Parts*, and constrained to move into *other Quarters*. And if 'twas an *Island* where they found the *Shells*, they straightways concluded that the *whole Island* lay *originally* at the *Bottom* of the *Sea*: and that 'twas either hoisted up by some *Vapour* from beneath: or
that

that the *Water* of the *Sea*, which formerly cover'd it, was in time *exhaled*, and *dried* up by the *Sun*, the *Land* thereby laid *bare*, and these *Shells* brought to *light*. But if 'twas in any part of the *Continent* where they found the *Shells*, they concluded that the *Sea* had been *extruded* and *driven off* by the *Mud* that was continually brought down by the *Rivers* of those *Parts*.

That I may not be over-tedious here, I will only add, that I shall clearly shew, from plain *passages* of their own *Writings* yet extant, that 'twas meerly the finding these *Sea-shells* at *Land* that occasioned this *Stir*, and raised all this *Dust* amongst the *Ancients*: and upon which principally they grounded their *Belief* of the *Vicissitudes* and *Changes* of *Sea* and *Land*, wherewith their *Writings* are so filled. But how little *Reason* they had for it: and how far *those* have been over-seen who have followed them herein, hath been intimated already, and will appear farther from the following *Part* of this *Essay*, to the Account of which I now hasten.

PART II.

*Concerning the Uinverfal Deluge.
That theſe Marine Bodies were
then left at Land. The Effects
it had upon the Earth.*

THE *Conſectaries* of the former Part of this Diſcourſe are all *negative*; that being only introductory, and ſerving but to clear the way to this ſecond Part: to free the Enquiry from the *Perplexities* that ſome Undertakers have encumber'd it withall: and to ſet aſide the falſe Lights they uſed in queſt of the *Agent* which tranſpoſed theſe *Sea-ſhells* to Land.

Having therefore diſcharged my hands of *that Task*, and from *Obſervation* of the preſent State of the *Earth*, and of the *Site* and *Condition* of the *Marine Bodies* which are lodged within and upon it, ſhewn that they could
not

not possibly be reposed in that manner by *particular Inundations*: by the Sea's receding and shifting from place to place: nor by any of the *other Means* there proposed; I pass next on to search out the *true means*: and to discover the *Agent* that did actually bring them forth, and disposed them into the *Method* and *Order* wherein we now find them. To which purpose I have recourse again to the *Observations*; for by their Assistance this Matter may be rightly and fully adjusted. So that I shall only proceed, as hitherto, to make *Inferences* from them; which *Inferences*, in *this Part* are all *affirmative*. Of these, the first is,

That these *Marine Bodies* were born forth* of the Sea by the *Universal Deluge*: and that, upon the return of the *Water* back again from off the Earth, they were left behind at Land.

I.
* Confer.
Part 3.
Sect. 2.
Conf. 2, 3.

This is a *Proposition* of some weight and consequence. Upon which Account I shall be somewhat prolix and particular in the *Establishment* of it; careful and exact in conferring every *Circumstance* of these *Marine Bodies*, to see how they square with it: and shall not dismiss it till I have evinced

that *those* which I prest, in the *precedent Part*, as *Objections* against the *several Ways* there propounded, all fall in here, and are the clearest and most convincing *Arguments* of the *Truth* hereof: that *this*, and *this alone*, does naturally and easily account for all those *Circumstances*: and fairly takes off all *Difficulties*. Which *Difficulties* I propose at large: and particularly those which have of late been urged, by some *Learned Men*, as *Proofs* that these *Bodies* were not left behind by the *Deluge*; shewing of how little *Validity* they are.

Which being dispatch'd, I return back to my *Observations*: and proceed upon *them* to represent the *Effects* that the *Deluge* had upon the *Earth*, and the *Alterations* that it wrought in the *Globe*; some whereof were indeed very extraordinary. These I distribute into *two Classes*; the *first* of which will contain *those* that are *only probable*, and of which we have some reasonable *Intimations*, but not an absolute and demonstrative *Certainty*, the *Proofs* whereon they depend being more remote. And these I shall wholly wave at present, and not crowd
this

this shorter Treatise with the *Relation* of them, reserving that Room for *those* of the *second Class*, which are those whereof we have a plain and undeniable *Certainty*: those which flow directly and immediately from the *Observations*: and which are so evident, that 'tis impossible these *Marine Bodies* could have been any ways lodged in such *Manner*, and to so great *Depths*, in the *Beds* of *Stone*, *Marble*, *Chalk*, and the rest, had not *these Alterations* all happened. Namely,

2. That during the *Time* of the *Deluge*, whilst the *Water* was out upon, and covered the *Terrestrial Globe*, all the *Stone* and *Marble* of the *Antediluvian Earth*: all the *Metalls* of it: all *Mineral Concretions*: and, in a word, all *Fossils* whatever that had before obtained any *Solidity*, were totally dissolved, and their constituent *Corpuscles* all disjoyned, their *Cohesion* perfectly ceasing. That the said *Corpuscles* of these *solid Fossils*, together with the *Corpuscles* of those which were not before *solid*, such as *Sand*, *Earth*, and the like: as also all *Animal Bodies*, and *Parts* of *Animals*, *Bones*, *Teeth*, *Shells*: *Vegetables*, and
Parts

* Vid.
Part 3.
Sect. 1.
Consect. 1.

*Parts of Vegetables, Trees, Shrubs, Herbs: and, to be short, all Bodies whatsoever that were either upon the Earth, or that constituted the Mass of it, if not quite down to the Abyss *, yet at least to the greatest Depth we ever dig: I say all these were assumed up promiscuously into the Water, and sustained in it, in such manner that the Water, and Bodies in it, together made up one common confused Mass.*

3.

That at length all the *Mass* that was thus *born* up in the *Water*, was again *precipitated*, and *subsided* towards the bottom. That this *Subsidence* happened generally, and as near as possibly could be expected in so great a *Confusion*, according to the *Laws* of *Gravity* †; that *Matter*, *Body*, or *Bodies*, which had the *greatest quantity* or *degree* of *Gravity*, subsiding *first* in order, and falling *lowest*: that which had the next, or a still *lesser degree* of *Gravity*, subsiding *next* after, and settling upon the precedent: and so on in their *several Courses*; that which had the *least Gravity* sinking not down till *last* of all, settling at the *Surface* of the *Sediment*, and *covering* all the rest. That the *Matter*, subsiding thus,

† Confer.
p. 29. &c.

thus, formed the *Strata* of *Stone*, of *Marble*, of *Cole*, of *Earth*, and the rest; of which *Strata*, lying one upon another, the *Terrestrial Globe*, or at least as much of it as is ever displayed to view, doth mainly consist. That the *Strata* being arranged in *this Order* meerly by the *disparity* of the *Matter*, of which each consisted, as to *Gravity*, that *Matter* which was *heaviest* descending *first*, and all that had the *same degree* of *Gravity* subsiding at the *same time*: and there being *Bodies* of quite *different Kinds*, *Natures*, and *Constitutions*, that are nearly of the *same Specifick Gravity*, it thence happened that *Bodies* of quite *different Kinds* subsided at the *same instant*, fell together into, and composed the *same Stratum*. That for this reason the *Shells* of those *Cockles*, *Escalops*, *Pere-winkles*, and the rest, which have a *greater degree* of *Gravity*, were enclosed and lodged in the *Strata* of *Stone*, *Marble*, and the *heavier kinds* of *Terrestrial Matter*; the *lighter Shells* not sinking down till *afterwards*, and so falling amongst the *lighter Matter*, such as *Chalk*, and the like, in all such *Parts* of the *Mass* where there happened

pened to be any considerable quantity of *Chalk*, or other *Matter lighter* than *Stone*; but where there was *none*, the said *Shells* fell upon, or near unto, the *Surface*. And accordingly we *now* find the *lighter Kinds* of *Shells*, such as those of the *Echini*, and the like, very plentifully in *Chalk*, but of the *heavier kinds* scarcely one ever appears; these subsiding sooner, and so settling deeper, and beneath the *Strata* of *Chalk*. That *Humane Bodies*, the *Bodies* of *Quadrupeds*, and other *Land-Animals*, of *Birds*, of *Fishes*, both of the *Cartilaginous*, *Squamosse*, and *Crustaceous* kinds: the *Bones*, *Teeth*, *Horns*, and other *Parts* of *Beasts*, and of *Fishes*: the *Shells* of *Land-Snails*: and the *Shells* of those *River* and *Sea Shell-Fish* that were *lighter* than *Chalk*, &c: as also *Trees*, *Shrubs*, and all other *Vegetables*, and the *Seeds* of them: and that peculiar *Terrestrial Matter* whereof these consist, and out of which they are all formed: I say all these (except some *Mineral* or *Metallick Matter* happened to have been affix'd to any of them *, whilst they were sustained together in the *Water*, so as to augment the *Weight* of them) being,

* Part 4.
Consect. 2.

being, bulk for bulk, *lighter* than Sand, Marl, Chalk, or the other ordinary Matter of the Globe, were not precipitated till the last, and so lay above all the former, constituting the *supreme* or *outmost Stratum* of the Globe. That *these* being thus lodged upon the rest, and consequently more nearly exposed to the Air, Weather, and other Injuries; the Bodies of the Animals would suddenly corrupt and rot: the Bones, Teeth, and Shells, would likewise all rot in time, except those which were secured by the extraordinary Strength and Firmness of their Parts, or which happened to be lodged in such places where there was great Plenty of bituminous or other like Matter to preserve, and, as it were, embalm them: that the Trees would in time also decay and rot, unless such as chanced to be reposed in, and secured by the same kind of Matter: that the other more tender Vegetables, Shrubs, and Herbs, would rot likewise and decay: But the Seeds of all kinds of Vegetables, being by this means reposed, and, as it were, planted near the Surface of the Earth, in a convenient and natural Soil, amongst Matter proper
for

for the *Formation* of *Vegetables*, would *germinate*, *grow up*, and replenish the *Face* of the *Earth*: And that *vegetative terrestrial Matter*, that fell, along with these, into this uppermost *Stratum*, and of which principally it *consists*, hath been ever since, and will continue to be, the standing *Fund* and *Promptuary* out of which is derived the *Matter* of all *Animal* and *Vegetable Bodies*, and whereinto, at the *Dissolution* of those *Bodies*, that *Matter* is *restored* back again successively for the *Constitution* and *Formation* of

* V. Part.

V. Conf. 1. others. *

4.

That the *Strata* of *Marble*, of *Stone*, and of all other *solid Matter*, attained their *Solidity*, as soon as the *Sand*, or other *Matter* whereof they consist, was arrived at the *Bottom*, and well *settled* there. And that all those *Strata* which are *solid* at *this day*, have been so ever since that *Time*.

5.

That the said *Strata*, whether of *Stone*, of *Chalk*, of *Cole*, of *Earth*, or whatever other *Matter* they consisted of, lying thus each upon other, were all originally *parallel*: that they were *plain*, *even*, and *regular*; and the *Surface* of the *Earth* likewise *even* and

and *spherical*: that they were *continuous*, and not *interrupted*, or *broken*: and that the *whole Mass* of the *Water* lay then *above* them all, and constituted a *fluid Sphere* environing the *Globe*.

That after some time the *Strata* were *broken*, on all sides of the *Globe*: that they were *dislocated*, and their *Situation* *varied*, being *elevated* in some *Places* and *depressed* in others.

That the *Agent*, or *Force*, which effected this *Disruption* and *Dislocation* of the *Strata*, was seated *within* the *Earth*.

That all the *Irregularities* and *Inequalities* of the *Terrestrial Globe* were caused by *this means*: date their *Original* from *this Disruption*, and are all entirely owing unto it. That the natural *Grotto's* in *Rocks*, and those *Intervalls* of the *Strata*, which, in my *Observations*, I call the *Perpendicular Fissures*, are nothing but these *Interruptions* or *Breaches* of the *Strata*. That the more *eminent Parts* of the *Earth*, *Mountains* and *Rocks*, are only the *Elevations* of the *Strata*; these, wherever they were *solid*, rearing against and *supporting* each other in the

6.

7.

8.

¶ Conf.
Conf. 5.
supra.

the *Posture* whereinto they were put by the *bursting* or *breaking up* of the *Sphere of Earth* || : and *not falling* down again, nor returning to their former and more level Site, as did the *Strata of Earth*, and other *Matter* that was *not solid*, and had no *Strata of Stone*, or other *consistent Matter*, interposed, amongst their *Strata*, underneath, to uphold them in the *Posture* they were then raised into. For which reason 'tis, that *Countries* which abound with *Stone*, *Marble*, or other *solid Matter*, are *uneaven* and *mountainous*: and that those which afford none of these, but consist of *Clay*, *Gravel*, and the like, without any *Stone*, &c. interposed, are more *champaign*, *plain*, and *level*. That the *lower Parts* of the *Earth*, *Vallies*, the *Chanel of the Sea*, and the rest, are nothing but *Depressions* of the *Strata*. That *Islands* were formed and distinguished by the *Depression* or *sinking down* of the *Strata* lying betwixt each of them, and betwixt them and the *Continent*. In one word, that the *whole terraqueous Globe* was, by *this Means*, at the *Time of the Deluge*, put into the *Condition* that we now behold.

Here

Here was, we see, a mighty *Revolution*: and *that* attended with *Accidents* very strange and amazing: the most horrible and portentous *Catastrophe* that *Nature* ever yet saw: an elegant, orderly, and habitable *Earth* quite *unhinged*, shattered all to *Pieces*, and turned into an heap of *Ruins*: *Convulsions* so exorbitant and unruly: a *Change* so exceeding great and violent, that the very *Representation* alone is enough to startle and shock a Man. In truth the Thing, at first, appeared so *wonderful* and *surprizing* to me, that I must confess I was for some time at a stand. Nor could I bring over my *Reason* to assent, untill, by a deliberate and careful *Examination* of all *Circumstances* of these *Marine Bodies*, I was abundantly convinced that they could not have come into those *Circumstances* by any other *Means* than such a *Dissolution* of the *Earth*, and *Confusion* of *Things*. And were it not that the *Observations*, made in so *many*, and those so *distant Places*, and repeated so often with the most scrupulous and diffident *Circumspection*, did so establish and ascertain the thing, as

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not

not to leave any room for *Contest* or *Doubt*, I could scarcely ever have credited it.

And though the whole *Series* of this extraordinary *Turn* may seem at first view to exhibit nothing but *Tumult* and *Disorder*: nothing but hurry, jarring, and distraction of things: though it may carry along with it some slight shew that 'twas managed *blindly* and at *random*: yet if we draw somewhat nearer, and take a closer prospect of it: if we look into its *retired Movements*, and more secret and latent *Springs*, we may there trace out a *steady Hand*, producing *Good* out of *Evil*: the most consummate and absolute *Order* and *Beauty*, out of the highest *Confusion* and *Deformity*: acting with the most exquisite *Contrivance* and *Wisdom*: attending vigilantly throughout the whole *Course* of this grand *Affair*, and directing all the several *Steps* and *Periods* of it to an *End*, and that a most noble and excellent one; no less than the *Happiness* of the whole race of *Mankind*: the *Benefit*, and universal *Good*, of all the many *Generations* of *Men* which were to come after: which were to inhabit *this Earth*, thus *moduled*

duled anew, thus suited to their present Condition and Necessities.

But the *Presidence* of that *mighty Power* in this *Revolution*: its particular *Agency* and *Concern* therein: and its *Purpose* and *Design* in the several *Accidents* of it, will more evidently appear, when I shall have proved,

That, altho' one *Intention* of the *Deluge* was to inflict a deserved *Punishment* upon *that Race* of *Men*, yet it was not *solely levelled* against *Mankind*, but *principally* against the *Earth* that then was; with design to *destroy* and *alter* that *Constitution* of it, which was apparently *calculated* and *contrived* for a *State* of *Innocence*: to fashion it afresh, and give it a *Constitution* more nearly accommodated to the *present Frailties* of its *Inhabitants*.

That the said *Earth*, though not indifferently and alike *fertil* in all parts of it, was yet generally much *more fertil* than *ours* is. That the *exteriour Stratum* or *Surface* of it, consisted entirely of a kind of *terrestrial Matter* proper for the *Nourishment* and *Formation* of *Plants*, and this in great *Plenty* and *Purity*; being little, or not at all, entangled with an *Intermixture*

of meer *Mineral Matter* that was unfit for *Vegetation*. That its *Soil* was more *luxuriant*: and teemed forth its *Productions* in far greater *Plenty* and *Abundance* than the *present Earth* does. That the *Plough* was *then* of no use, and not invented till *after* the *Deluge*; that *Earth* requiring little or *no Care* or *Culture*, but yielding its encrease *freely*, and without any considerable *Labour* and *Toil*, or assistance of *Humane Industry*; by this means allowing *Mankind* that *Time*, which must otherwise have been spent in *Agriculture*, *Plowing*, *Sowing*, and the like, to far more divine and noble *Uses*: to *Purposes* more agreeable to the *Design* of their *Creation*; there being no hazard, whilst they continued in that *State of Perfection*, of their abusing this *Plenty*, or preverting it to any other *End* than the *sustenance* of *Nature*, and the necessary *support* of *Life*.

That when *Man* was *fallen*, and had abandoned his *primitive Innocence*, the *Case* was much *altered*: and a far *different Scene* of Things presented. That generous *Vertue*, masculine *Bravery*, and prudent *Circumspection* which

which he was before Master of, now deserted him, together with that *Innocence* which was the *Basis* and *Support* of all : and a strange *Imbecility* immediately seized and laid hold of him. He became *pusillanimous*, and was easily ruffled with every little *Passion* within : supine, and as openly exposed to any *Temptation* or *Assault* from without. And now those *exuberant Productions* of the *Earth* became a continual *Decoy* and *Snare* unto him. They only excited and fomented his *Lusts* : and ministred plentiful *Jewel* to his *Vices* and *Luxury*. And the *Earth* requiring little or no *Tillage*, there was little occasion for *Labour* ; so that almost his *whole Time* lay upon his hands, and gave him *Leisure* to contrive, and full swing to pursue his *Follies* ; by which *Means* he was laid open to all manner of *Pravity*, *Corruption*, and *Enormity*. So that we need not be much surprized to hear *That the wickedness of Man was great in the Earth, and that every imagination of the thoughts of his heart was only evil continually* * : nor *Gen.vi.5.* more, that *that Generation* of Men was more particularly addicted to *Intemperance*, *Sensuality*, and *Unchastity* :

|| Matth.
xxiv. 38.

* Gen. vi. 2.

† Gen. vi.
11, 12.

ty: that they spent their time in Gluttony, in *Eating and Drinking*, in Lust and Wantonness, or, as the sacred Writer cleanly and modestly expresses it, in *marrying, and giving in marriage* ||, and this without Discretion or Decency, without regard to Age or Affinity, but promiscuously, and with no better a Guide than the Impulses of a brutal Appetite, *They took them Wives of all which they chose* * ; Plenty and Abundance, Idleness and Ease, so naturally cherishing and promoting those particular Vices. Nor lastly, is it strange that the Apostacy was so great, the Infection so universal: that *the Earth was filled with violence*, and that *all flesh had corrupted his way* † ; the Cause of this Corruption, the Fertility of that Earth, being so universal, so diffusive and epidemical. And indeed, 'twould be very hard to assign any other single Cause, besides this, that could ever possibly have had so spreading and general an Effect as this had. The Pravity of humane Nature is not, I fear, less than it was then: The Passions of Men are yet as exorbitant, and their Inclinations as vicious: Men have been wicked since the Deluge: they are so still: and will be

be so, but not *universally*. There are now *Bounds* set to the *Contagion*: and 'tis restrained by removing the *main Cause* of it. But *there*, the *Venom* manifested it self on all hands: *spread* far and near, scarcely stopping till 'twas insinuated into the whole *Mass* of *Mankind*: and the *World* was little better than a common Fold of *Phrenetics* and *Bedlams*.

That to *reclaim* and *retrieve* the *World* out of this *wretched* and *forlorn State*, the common *Father* and *Benefactor* of *Mankind* seasonably interposed his *Hand*: and rescued miserable *Man* out of the gross *Stupidity* and *Sensuality* whereinto he was thus unfortunately plunged. And this was Effected partly by tying up his *Hands*, and *shortning* the *Power* of *Sinning*: checking him, in the *Career* of his *Follies*, by *Diseases* and *Pains*: and setting *Death*, the *King* of *Terrors*, which before stood *aloof off*, and at the *long distance* of eight or nine hundred Years, now much *nearer* to his view, ordaining that *his days shall be but an hundred and twenty years* †: and † *Gen.* partly by removing the *Temptation*, 6. 3.

* Gen. vi. 13. *And behold I will DESTROY them with THE EARTH.* And again, at the Covenant made with Noah, after the Deluge, more distinctly Gen. ix. 11. *Neither shall all flesh be cut off any more by the waters of a flood: neither shall there any more be A FLOOD TO DESTROY THE EARTH;* the latter part whereof is render'd somewhat more expressly by the Septuagint $\kappa\acute{\iota}\ \epsilon\kappa\ \epsilon\pi\ \epsilon\sigma\alpha\iota\ \kappa\alpha\lambda\alpha\chi\lambda\upsilon\sigma\mu\acute{o}\varsigma\ \upsilon\delta\alpha\tau\omicron\varsigma\ \kappa\alpha\lambda\alpha\phi\theta\epsilon\iota\sigma\alpha\iota\ \Pi\alpha\sigma\sigma\alpha\varsigma\ \tau\eta\varsigma\ \gamma\omega\epsilon\varsigma$. i. e. *And there shall not be any more a Deluge of Water to destroy the WHOLE EARTH.* And the vulg. Lat. *Neque erit deinceps Diluvium dissipans terram*, i. e. *Neither shall there be hereafter a Deluge to dissipate [or dissolve] the Earth.* And of this Dissolution of the Earth there was a Tradition amongst the Ancients, both Jews and Gentiles.

† Dr. Burnet Theory of the Earth. || Vid. Conf. 2. supra.

** Part 4. Conf. 3.

*stituent Principles: by mingling, and confounding them: the Vegetative with mineral Matter, and the different Kinds of mineral Matter with each other **:* and by retrenching a considerable quantity of the vegetable Matter, (which lay in such Plenty and Purity at the Surface of the Antediluvian Earth, and rendred it so exuberantly

and Cause of the Sin: by Destroying * that Earth which had furnish'd forth Maintenance in such Store unto it: by changing that Constitution of it, and rendring it more agreeable to the laps'd and frail State of Mankind. That this Change was not wrought by altering either the Form of the Earth, or its Position in respect of the Sun, as was not long ago surmised by a very Learned Man †, but by dissolving || it: by reducing all the Matter of it to its first con-

rantly fruitful) and precipitating it, (at the time of the *subsidence* || of the || *vid. Conf.* general Mass of Earth and other Bo- 3. *supra.* dies, which were before raised up into the Water) to such a Depth as to bury it, leaving only so much of it near the Surface as might just sufficiently satisfy the Wants of humane Nature, but little or no more; and even that not pure, not free from the intermixture of meer *steril* mineral Matter, and such as is in no wise fit for the Nutrition of Vegetables; but so that it should require Industry and Labour to excite it, and not yield a competent Crop without Tillage and Manure. That by this Means, a great part of that Time, which the Inhabitants of the former Earth had to spare; and whereof they made so ill Use, was employed, and taken up in Digging and Plowing, in making provision for Bread, and for the Necessities of Life: and that Excess of Fertility, which contributed so much to their Miscarriages, was retracted and cut off.

That had the Deluge been aimed only at Mankind: and its utmost Design meerly to punish that Generation, and thereby to deterr Posterity from the like

like *Offences*; *this* might have been brought about by *Means* much more *compendious*, and *obvious* too, and yet equally *terrifying* and *exemplary*. *Mankind*, I say, might have been *taken off* at a far *cheaper rate*: without this *ransacking* of *Nature*, and turning all things topsie-turvy: without this *battering* of the *Earth*, and *unhinging* the whole *Frame* of the *Globe*. The *Business* might have been done as effectually by *Wars*; the *Heart* of every *Man* of them was in the *Hand* of *God*, and he could easily have made them *Executioners* of his *Wrath* upon *one another*. He had the command of *Famine*, of *Pestilence*, and a thousand other *Disasters*, whereby he could have carried them off by *Shoals*, yea swept them all clear away. Besides, he had the whole *Artillery* of the *Sky* in his *Power*, and might presently have *Thunder-struck* them all, or *destroyed* them by *Fire* from *Heaven*. But none of all *these* were used: though 'tis most apparent that any of them would have been as *fatal* and *pernicious* to *Man* as the *Deluge* was. For the *Design* lay a great deal *deeper*: and *these* would have fallen short of it. *These* would

would never have reach'd the *Earth* : nor affected *that* in the least. They could never have touch'd the *Head* : or stop'd the *Source* of these unhappy *Misdemeanours* , for which the *Punishment* was sent. *That* was what nothing but a *Deluge* could reach ; and as long as the *Cause* remained : as long as the *old Temptation* was still behind, every *Age* would have lain under *fresh Inducements* to the same *Crimes* : and there would have been a *new necessity* to *punish* and *reclaim* the *World* : to *depopulate* the *Earth*, and *reduce* it again to a vast *Solitude*, as constantly as there succeeded a *new Age* and *Race* of *Men*. For the *Terror* of the *Calamity* would not have extended it self much *farther* than the *Men* which *suffered* under the weight of it: and a *few Years* would have worn out, in great measure, the *Impressions* it made. This we see even from the *Example* of the *Deluge* it self. As formidable as *that* was to those who lived at, or near the *Time* of it, who saw the prodigious *Devastations* it had made, the *horrible Methods* by which 'twas brought about, and the *Reason* why 'twas inflicted : and to *their Posterity*

sterity, for a few *Generations*; yet the *Fright* was not *lasting*: 'twas not long e're the *Sting* of it was worn out. And though the *Elder Ages* knew full well that there had been such a *Deluge*: and had some *Tradition* of the cruel *Desolation* it made; yet by degrees the *Particulars* of it were drop'd, and the most *frightful Passages* bore the least share in the *Relation*; being probably so *strange* as to be hardly *credible*: and carrying rather an appearance of *Figment* and *Invention*, in those that handed down the *Memory* of it, than of *Truth* and *Reality*. So that upon the whole 'tis very plain that the *Deluge* was not sent only as an *Executioner* to *Mankind*: but that its *prime Errand* was to *re-form* and *new-mold* the *Earth*.

That therefore as much *Harshness* and *Cruelty* as this great *Destruction* of *Mankind* seemingly carries along with it: as *wild* and *extravagant* a thing as that *Dissolution* of the *primitive Earth* appeared at first Sight; all the *Severity* lay in the *Punishment* of that *Generation*, (which yet was no more than what was *highly just*, yea and *necessary* too:) and the whole
of

of the *Tragedy* terminated there. For the *Destruction* of the *Earth* was not only an Act of the profoundest *Wisdom* and *Forecast*, but the most monumental *Proof* that could ever possibly have been given, of *Goodness*, *Compassion*, and *Tenderness*, in the *Author* of our *Being*; and *this* so liberal too and *extensive*, as to reach all the *succeeding Ages* of *Mankind*: all the *Posterity* of *Noah*: all that should dwell upon the thus *renewed Earth* to the *End* of the *World*; by this *Means* removing the old *Charm*: the *Bait* that had so long *bewildred* and *deluded* unhappy *Man*: setting him once more upon his *Legs*: reducing him from the most abject and stupid *Ferity*, to his *Senses*, and to *sober Reason*: from the most deplorable *Misery* and *Slavery*, to a *Capacity* of being *happy*.

That *this Remedy* was made use of notwithstanding that it struck as deep at the *Intellectuals*, as at the *Morals* of *Mankind*: that *Ignorance* and *Rudeness* would be as necessary a *Consequence* of it, as *Reformation* of *Life*: and that this so general *Employ* and *Expence* of their *Time* would as assuredly *curtail* and *retrench* the ordinary means of *Knowledge*

* Confer.
p. 55. &
seq.

Knowledge and Erudition *, as 'twould shorten the Opportunities of Vice. And so accordingly it fell out; An universal *Rusticity* presently took place: spread on all hands, and stop'd not till it had over-run the whole Stock of Mankind. Those first Ages of the new World were simple, and illiterate to Admiration, and 'twas a long time e're the Cloud was withdrawn: e're the least spark of *Learning* (I had almost said of *Humanity*) broke forth, or any Man betook himself to the promotion of Science. Nay the Effects of it are visible to this hour: a general *Darkness* yet prevails, and hangs over whole Nations: yea the far greater part of the World is still barbarous and savage. I say, tho' 'twas most evident that this Remedy must needs have this Consequence also as well as the other, yet it was not suspended or chang'd upon that account; An egregious and pregnant Instance how far *Vertue* surpasses *Ingenuity*: how much an honest *Simplicity*, *Probity* of Mind, *Integrity* and *Incorruptness* of Manners, is preferable to fine Parts, profound *Knowledge*, and subtle *Speculations*. I would not have this interpreted an *Invective* against

against *Humane Learning*, or a decrying any commendable *Accomplishments* either of *Body* or *Mind*, (that is what no Man will, I hope, suspect me of) but only an intimation that *these* are not of any solid *Use*, or real *Advantage*, unless when aiding and serviceable to the *other*.

Nor does this *grand Catastrophe* only present us with *Demonstrations* of the *Goodness*, but also of the *Wisdom* and *Contrivance* of its *Author*. There runs a *long Train* of *Providence* thro' the *whole*: and shines brightly forth of all the various *Accidents* of it. The *Consolidation* of the *Marble*, and of the *Stone*, immediately after their *Settlement* to the bottom: the *Disruption* of the *Strata* afterwards: their *Dislocation*, the *Elevation* of some, and *Depression* of others of them, did not fall out at *random*, or by *chance*: but were managed and directed by a more steady and discerning *Principle*. For Proof whereof, this is indeed the proper *Place*; but, in regard that there are some things advanced in the succeeding, or *third Part* of this *Discourse*, which give some *farther light* to this matter, I shall beg leave to break off here, and
to

to deferr it a while, untill I have first proposed them.

* Conf.
Part 6.

Thus have I drawn up a *brief Scheme* of what befell the *Earth* at the *Deluge*: and of the *Change* that it then underwent. I have, by comparing its *Antediluvian* * with its *present State*, found where chiefly the *Difference* lay; viz. in *Degree* of *Fertility*. I have endeavour'd also to discover the *Reason* why this *Change* was made in it. For since that the *Process* of it was so *solemn* and *extraordinary*: that there were so *many*, and those so *strange Things* done: that the *first Earth* was perfectly *unmade* again, taken all to pieces, and *framed a-new*; and indeed, the very *same Method* that was used in the *original Formation* of it, used likewise in this *Renovation*; *our Earth* standing the *first Step* after its *Dissolution*, in the *same Posture* that the *Primitive Earth* did the first step after its *Rise* out of *Nothing*; which the *Reader* will easily find by conferring the *fifth Proposition* of this *Part* with *Gen. i. v. 2. and 9*: since likewise there was so *mighty* an *Hand* † concerned, and which does not act without *great* and *weighty Reasons*, there could be no *Doubt* but that

† Conf.
Part 3.
Sect. 2.
Conf. 7.

that there was some real and very necessary *Cause* for the making that *Alteration*. Nor was such a *Cause* very hard to be found out. The *first Earth* was suited to the *first State* of *Mankind*, who were the *Inhabitants* of it, and for whose *Use* 'twas made. But when *Humane Nature* had, by the *Fall*, suffer'd so great a *Change*; 'twas but necessary that the *Earth* should undergo a *Change* too, the better to accommodate it to the *Condition* that *Mankind* was then in: and such a *Change* the *Deluge* brought to pass.

But lest that the *Brevity* which I have above used, and which indeed I am tyed up to, in my Representation of this matter, should render it liable to *Misconstruction*: or that any one should suspect, that what I have delivered concerning the *Fertility* of that *Earth*, does not well square with the *Mosaick Description* of it, I must beg leave to make a *Digression* here, that I may explain my self a little more upon that Head. And that the *Reader* may himself be *Judge* in the Case, I shall fairly lay down *Moses's* sense of it in his own words.

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Vers. 17.

Bayrische
Staatsbibliothek
München

Gen. iii. Ver. 17. *And unto Adam he said, because thou hast hearkned unto the Voice of thy wife, and hast eaten of the Tree of which I commanded thee, saying, thou shalt not eat of it: Cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life.*

Ver. 18. *Thorns also and Thistles shall it bring forth to thee: and thou shalt eat the herb of the field.*

Ver. 19. *In the sweat of thy face shalt thou eat bread, till thou return unto the ground; for out of it wast thou taken: for dust thou art, and unto dust shalt thou return.*

Ver. 23. *Therefore the Lord God sent him forth from the Garden of Eden, to till the ground from whence he was taken.*

Gen. iv. Ver. 2. *Cain was a tiller of the ground.*

All which may be well reduced to two plain and short Propositions.

1. That *Adam's* Revolt drew down a Curse upon the *Earth*.

2. That there was some sort of *Agriculture* used before the *Deluge*.

As to the former, the *Curse* upon the *Earth*, I shall not in the least go about to extenuate the Latitude of it: or to stint it only to the Production of Weeds, of *Thorns*, *Thistles*, and other
the

the less useful kinds of *Plants* : but shall give it its full scope, and grant that no less than an universal *Restraint* and *Diminution* of the *primitive Fruitfulness* of the *Earth* was intended by it; this indeed seeming to be the plain and genuine *meaning* of the *Words*. But the Question is, whether this *Curse* was *presently* inflicted or not : whether it was succeeded with an *universal Sterility*, and the *Earth's* native and original *Exuberance* all straitways check'd and turn'd to as general a *Desolation* and *Barrenness*. And here I entreat it may be taken notice, that *this* was but *one*, and that much the *lesser* Part of the *Sentence* past upon *Adam*. The *other* was *Death* * ; which, 'tis most certain, * *Conf.* was not *immediately* inflicted. And *Rom. v.* yet *this* was pronounc'd at the same *12. and* time and with the same breath, that *1 Cor. xv.* the other was : *Unto dust shalt thou return.* Nay and much more emphatically a little before ||, *In the day that* || *Gen. ii.* *thou eatest thereof thou shalt surely dye.* *17.*

This was exceedingly peremptory : and the *very Day* fix'd likewise. Notwithstanding, through the Clemency and Goodness of God, *Execution* was delayed for a long time ; *Adam* being

reprieved for eight or nine hundred
†Gen.v.5. years †. The Dominion of *Death*
over him commenc'd indeed not only
the same Day that *Sentence* was past,
but the very minute that he tasted the
forbidden *Fruit* : and *Mortality* went
hand in hand with the *Transgression*.
But 'twas a *long time* before it had
raised any *Trophies* : or made a final
and absolute *Conquest*.

Why therefore may we not as well
suppose the *other Part* of the *Sentence*,
the *Sterilizing* the *Earth*, was also
suspended for some time, and *deferr'd*
till the *Deluge* happened, and became
the Executioner of it ? 'Tis certainly
very hard to imagine that God should
destroy the *Work* of his hands almost
as soon as he had *finish'd* it : that all
things should be *unhinged* again by
such time as they were well *ranged*
and put in *order* : and that the *Fra-*
grancy and lovely *Verdure* which then
appeared every where, and which had
but just shewed it self, should be nip'd
in the bud, and *blasted* all of a sudden.
To be short, 'tis, I think, most appa-
rent, that as on the other part *Mor-*
tality did presently *enter* and *take place*,
but got not *full possession* of many
Ages

Ages after : so here, *Thorns, Thistles,* and other the like *Consequences* of this *Curse*, immediately sprung out of the *Ground*, and manifested themselves on every side ; but it had not its full *Effect*, nor was the Earth *impoverish'd*, or its *Fertility*, sensibly *curb'd*, till the *Deluge*. And , for proof of *this*, I appeal to the *Remains* of *that Earth* : the *Animal* and *Vegetable Productions* of it still preserved ; the vast and incredible *Numbers* whereof notoriously testify the extreme *Luxuriance* and *Fæcundity* of it. And I need but produce *these* as *Evidences* that at the time that the *Deluge* came, the *Earth* was so loaded with *Herbage*, and throng'd with *Animals*, that such an *Expedient* was even wanting to ease it of the *Burden*, and to make room for a *Succession* of its *Productions*. For *this* also I appeal to *Moses* himself, who openly acknowledgeth that this *Curse* did not take place effectually till the *Deluge*. For he tells us, that, after the *Deluge* was over, and *Noah* and his Family came forth of the *Ark*, *He builded an Altar unto the Lord, and offered burnt-offerings on the Altar ; and the Lord smelled a sweet savour, and the Lord said in his heart, I will not again*

*Gen. viii.
20, 21.

Curse the Ground *any more, neither will I again smite any more every thing living as I have done* *. Wherein he plainly refers to the *Curse* denounc'd above, at the Apostacy of *Adam*: implying that it was not *fulfilled* till the *Deluge*. And a little after he as plainly intimates, that the *Fulfilling* of it lay in the *Destruction* of the *Earth* then wrought. For, speaking again of the same thing, instead of the Expression [*Curse the Ground*] here used, he makes use of [*Destroy the Earth.*] The whole Passage runs thus; *And I will establish my Covenant with you, neither shall all flesh be cut off any more by the waters of a flood: neither shall there any more be a Flood to destroy the Earth* *.

* Gen. ix.
11.

Nor is it indeed in any wise strange that this *Curse* had not its *Effect* sooner: especially since 'twas not limited to any time. There are so many *Presidents* on Record in *Holy Writ* of this way of proceeding, that no one can be well ignorant of them; so that I shall not need to charge this place with more than one, and that shall be the Case of *Ham*, for which we are likewise beholden to the same Author,
Moses.

Moses. This Person, by his indiscreet and unnatural *Irrision* and *exposing* of his *Father*, incurs his *Indignation*, and *Curse*. But, which is very remarkable, *Noah* does not lay the *Curse* upon *Ham*, who was actually guilty of the Crime; whether out of greater *Tenderness*, he being of the two nearer allied unto him, or for what other reason I shall not here enquire, but transfers it to *Canaan*: *Cursed be Canaan, a Servant of Servants shall he be to his Brethren: to Shem and to Japhet.* Nay, which is still more, this was never inflicted upon *Canaan* in Person, but upon his *Posterity*; and that not till many Generations afterwards, at such time as the *Israelites* returning out of *Egypt*, possess themselves of the Country of the *Canaanites*, and made them their *Servants*. The Story is so well known, that I shall not need to point it out to the Reader, who may peruse it at his leisure. 'Twas well on-wards of a thousand Years before ever this *Curse* began to take effect: before the *Canaanites* were brought under *Servitude* by the *Israelites*, who were descended from *Shem*: and a great many more before 'twas finally accomplished,

ed, and *they* subjected unto the Posterity of *Japhet*. To conclude, 'twas really a *longer time* before *this*, than it was before *the other*, the *Curse* upon the *Earth*, was fully brought about.

To proceed therefore to the *other Point*, the *Tillage* of the *Earth* before the *Deluge*. That there was *Tillage* bestowed upon it *Moses* does indeed intimate in general and at large: but whether it was bestowed on *all*, or only upon *some Parts* of *that Earth*: as also *what Sort* of *Tillage* that was, and what *Labour* it cost, is not exprest; so that for all this we are at *liberty* and may use our *Discretion*. For the present I must pass by the *Enquiry*: but in due place I hope to give some Satisfaction in it, and to shew that *their Agriculture* was nothing near so *laborious*, and *troublesome*, nor did it take up so much *Time* as *ours* doth. That's a *Consequence* of the *Proof* of the *greater Fertility* of *that Earth*; it being plain that the more it exerted that *Fertility*, the less need there was of *Manure*, of *Culture*, or *Humane Industry* to excite and promote it. Nor can any Man reasonably suspect, because of this mention of *Tillage*, that
the

the *Curse* upon the *Ground* was come on, or that the *primitive Exuberance* of the *Earth* was *lessened* and *abridged*, before the *Deluge*; for *Moses* makes mention of *Tillage* before ever *Adam* was created; *There was not*, says he †, †*Gen. ii. 5.* *a man to till the ground*: and consequently, there would have been requisite such a *Tillage* as *this* which he speaks of in these three Chapters, tho' the *Curse* had never been *denounc'd*, or *Man* had not *fallen*. But 'tis highly probable that upon *Adam's* Disobedience, Almighty God chased him out of *Paradise*, the *fairest* and most *delicious* Part of *that Earth*, into some other the most *barren* and *unpleasant* of all the whole *Globe*; the more effectually to signify his *Displeasure*, and to convince that unhappy *Man* how great a *Misfortune* and *Forfeiture* he had incurred by his late *Offence*. And here, above all other Parts of the *Earth*, there would be *Work* and *Employ* for him, and for his Son *Cain*.

And thus much may serve for the present, to shew that my *Account* of the *Antediluvian Earth* is so far from *interfereing* with that which *Moses* hath given us, that it holds forth a natural

tural and unforc'd *Interpretation* of his *Sense* on this *Subject*. There are a few other *Passages* in the same *Author* which may require some *Explication*; but they are none of them *such* that a Reader of moderate Understanding may not easily clear them, without my Assistance, so that I shall not crowd *this Piece* with them; for I fear 'twill be thought that I have already taken too great a *liberty*. The *Compass* that I am confined unto, by *the Rules* of this kind of *Writing*, is so *narrow*, that I am forced to pass over *many things* in silence, and can but just touch upon *others*. To lay down every thing at *length*, and in its *full light*, so as to obviate all *Exceptions*, and remove every *Difficulty*, would carry me out too far beyond the *Measures* allowed to a *Tract* of *this Nature*. That's the *Business* of the *Larger Work*, of which *this* is only the *Module* or *Platform*. In *that Work* I hope to make amends for these *Omissions*, and particularly shall consider

What was the immediate *Instrument* or *Means* whereby the *Stone*, and other *solid Matter* of the *Antediluvian Earth* was dissolved, and reduced to the

the Condition mentioned *Consect.* 2. of this Part.

Why the *Shells, Teeth, Bones,* and other Parts of *Animal Bodies* : as also the *Trunks, Roots,* and other parts of *Vegetables,* were not dissolved, as well as the *Stone,* and other *Mineral Solids* of that Earth. Of this I shall assign a plain and *Physical Reason,* taken merely from the Cause of the *Solidity* of these *Mineral Bodies* ; which I shew to be quite different from that, whereunto *Vegetables* and *Animals* owe the *Cohesion* of their Parts : and that this was suspended, and ceased, at the time that the *Water* of the *Deluge* came forth ; which the other (I mean the Cause of the *Cohesion* of the Parts of *Animals* and *Vegetables*) did not, with the Reason of this likewise.

What was the Reason that (in case the *Terrestrial Globe* was entirely dissolved, and there be now, and was then a *Space* or *Cavity,* in the *Central* parts of it, so large as to give reception to that mighty *Mass* of *Water* which covered the *Earth* at the *De-* luge *) the *Terrestrial Matter* which first subsided, (as in *Consect.* 3. *supra*) did not fill the said *Cavity,* and descend quite

* Vid.
Part 3.
Sect. I.
Consect. 1.
and Sect.
2. *Conf.* 2,
3.

quite down to the *Center*, but *stop'd* at that *distance* from it, forming an arch-ed *Expansum*, or rather a *Sphere* around it; which is now the lowest *Stratum*, and *Boundary* of that vast *Conceptacle* of *Water*. As also how *this Water* was *raised* at the *Deluge*: by what *Issues* or *Outlets* it came forth: what *succeeded* into the *Room* of it, whilst *absent*: and *which way* it *return'd* back again.

By what means the *Strata* of *Stone*, and *Marble*, acquired such a *Solidity*, as soon as the *Matter*, whereof they consist, had *subsided*, and was well *settled* to the bottom, as in *Consect.* 4. of this Part.

What was the immediate *Agent* which effected that *Disruption* of the *Strata*, and their *Dislocation* afterwards; whereof in *Consect.* 6. of this Part.

And because there have been some *Conjectures* formerly started by *Learned Men* about the *Formation* of *Sand-Stone*, the *Origin* of *Mountains*, and of *Islands*, that are *repugnant* to what I have *here* *advanc'd* upon those *Subjects*, I am obliged to look a little into the *Reasons* of them. And, that they may not remain as *Obstacles* to those who are less skilfull in these things, I shall

shall weigh their *Arguments*, detect the *Invalidity* of them, and prove, against them,

That the *Sand-Stone* now in *being* is not as old as the *Earth* it self: nor hath it been *consolidated* ever since the *Creation* of the *World*, as some *Au-thors* have believed.

That *Sand-Stone* does not now grow by *Juxtaposition*, as they speak; that is by continual *Addition* of new *Matter*; in like manner as the *Bodies* of *Animals* and of *Vegetables* grow, and are augmented; as others were of Opinion.

That *Sand-Stone* does not *still consolidate*: *i. e.* that *Matter* which was, a few Years ago, *lax, incoherent*, and in form of *Earth*, or of *Sand*, does not become daily more *hard* and *consistent*, and by little and little acquire a perfect *Solidity*, and so turn to *Stone*; as others have asserted.

That the *Mountains* of our *Earth* have not had *being* ever since the *Creation*: and stood as long as the *Earth* it self; as some *Writers* have thought.

That the said *Mountains* were not raised *successively*, and at *several times*, being flung up or elevated by *Earth-quakes*, some at one time, and some at another,

another, as those *Earthquakes* happened. That these are so far from *raising Mountains*, that they *overturn* and *fling down*, some of those which were before standing: and *undermine* others, sinking them into the *Abyss* underneath †. That of all the *Mountains* of the *whole Globe*, which are very numerous, and many of them extremely large, and consequently cannot be supposed to have been all thus raised without the *Notice* of *Mankind*, yet there is not any *authentick Instance*, in all *History*, of so much as *one single Mountain* that was heaved up by an *Earthquake*. That the *new Mountain* in the *Lucrine Lake*, not far from *Pozzuolo* in *Italy*, called *Monte di Cinere*, which is alledged by the *Fautors* of *this Opinion*, as an *Instance* in behalf of it, was not raised thus; the *Relators* of that *Accident*, as well those who were then living, as they who wrote since, unanimously agreeing that this *Tumulus*, or *Hill*, is no other than an huge *heap* of *Stones*, *Cinders*, *Earth*, and *Asbes*, which were *spued* up out of the *Bowels* of the *Earth*, by the *Eruption* of a *Volcano*, which happened there, in the Year 1538. And though

† Confer.

Part 3.

Sect. 1.

Cons. 12.

though this *Eruption* was preceded by several *Earthquakes* (the Country all round having been frequently shaken for almost the space of two years before) as those of *Ætna*, *Vesuvius*, and *Hecle* usually are, yet *this Hill* was not *elevated* or *heaved up* by any of those *Earthquakes*, but the *Matter*, whereof 'tis compiled, discharged out of the *Volcano*, as aforesaid; in like manner as *Ætna*, *Vesuvius*, and the rest, fling forth *Stones*, *Cinders*, &c. upon any extraordinary *Eruption* of them.

That there have not been any *Islands* of note, or considerable extent, *torn* and *cast off* from the *Continent* by *Earthquakes*, or *sever'd* from it by the boisterous *Allision* of the *Sea*. That *Sicily*, *Cyprus*, the *Negropont*, and many more, which have been supposed by some to be only *dismembered parcels* of the *Main-land*, and anciently *parted* from it by one or other of these *Means*, yet really never were so: but have been *Islands* ever since the time of the *Noetick Deluge*.

Unto this Second Part I shall annex,

A *Discourse* concerning the *Trees*, which are commonly called *Subterranean Trees*, or *Fossil Wood*, and which
are

* Moss is the Name used all over the North of England instead of Morass, or Marsh; of which indeed Moss seems to have been a Corruption.

† Conf.
Conf. 3.
supra.

are found in great plenty buried amongst other *Vegetable Bodies* in *Mosses* *, *Fens*, or *Bogs*, not only in *several Parts* of *England*, but likewise in many *Foreign Countries*; wherein I shall shew, from *Observations* made upon the *Places* where these *Trees* are digg'd up: upon the *Trees* themselves: their *Position* in the *Earth*, and other *Circumstances*, that they were lodged thus by the *Deluge*, and have lain here ever since. That there are found *great Numbers* of these *Trees*, and many of them *very large*, so buried in *several Islands* where no *Trees* at all do, or will *now* grow; the *Winds* being so fierce, and the *Weather* so severe, as not to suffer any thing to prosper or thrive beyond the height of a *Shrub*, in any of all those *Islands*, unless it be *protected* by *Walls*, as in *Gardens*, or other like *Coverture*. That the said *Trees* are in some places found enclosed in the *Stone* of *Quarries* and of *Rocks*: buried amongst *Marle*, and other kinds of *Earth*, as well as in this *Peat* or *Moss-Earth*. That they were *originally* lodged indifferently amongst all sorts of *Earth*, or other *Matter*, which lay near the *Surface* of the *Earth* †: and that

that they are at this day found very seldom unless in *this Peat-Earth*, is meerly *accidental*; *this Earth* being of a *bituminous* and *mild Nature*; so that the *Trees* lay all this while, as it were, *embalm'd* in it, and were by that Means *preserved* down to *our times*; whilst those which chanced to be lodged in *other Earth*, that was more *lax* and *pervious*, decayed in tract of time, and rotted at length, and therefore do not now appear at all, when we dig and search into *those Earths*. Or if any thing of them do appear, 'tis only the *Ruins*, or some flight *Remains* of them; there being very rarely found any *Trunks* of *Trees*, in these *laxer Earths*, that are *intire*, or tolerably *firm* and *found*. To conclude, from several of the *aforesaid Circumstances* I shall evince that these *Trees* could never possibly have been *reposed* thus by any other means than the *Deluge*: neither by *Men*: nor by *Inundations*: nor by *Deterrations* *: nor by violent and impetuous *Winds*: nor by *Earthquakes*; which are the *several Ways* whereby *Learned Men* have thought they were thus buried.

* Confer. 1

Part 5.

Consect. 2.

PART III.

Concerning the Fluids of the Globe.

SECT. I.

*Of the great Abyfs. Of the Ocean.
Concerning the Origine of
Springs, and Rivers. Of Va-
pours, and of Rain.*

HAVING thus done with the more bulky and corpulent Parts of the *Globe*, the next place in course is due unto *Metalls* and *Minerals*, which are the only remaining part of the *Terrestrial Matter* of it not yet treated of. And accordingly I should now pass on to *these*; but the present Oeconomy and Disposal of some of them being wholly owing to the *Motion* and *Passage* of *Water* in the interiour parts of the *Earth*, I have for that reason chosen

fen rather, that I may be as brief as possible, and avoid all needless Repe- titions, to wave *them* for a while, till I have first offered what I have to say about *that*.

The *Water* therefore of the Globe, as well that resident *in it*, as that which floats *upon it*, is the Subject which I purpose here to prosecute. In order whereunto, I shall sub-divide this third Part into *two Sections*; the *former* whereof will comprehend what relates to the present and *natural State* of the *Fluids* in and upon the *Earth*: the *other*, what concerns that extraordinary *Change* of this *State* which hap- pened at the *Deluge*, and how that *Change* was wrought.

At the head of the first of these *Se- ctions* I prefix a new set of *Observati- ons touching the Fluids of the Terraqueous Globe*: the *Sea, Rivers, and Springs*: the *Water* of *Mines, of Cole-pits*: of *Caves, Grotts, and the like Recesses*: as also concerning *Vapours, Rain, Hail, and Snow*.

And because this is a *Subject* of that vast *Latitude* that the Strength of one single Man will scarcely be reckoned sufficient effectually to cultivate and

carry it on, I have taken in the joint Assistance of *other Hands*, and super-added, to my own, all such *Relations* as I could procure from *Persons* whose Judgment and Fidelity might safely be relied upon, about the *Sea, Lakes, Rivers, Springs, and Rain*, not only of *this Island*, but many *other Parts* of the *World* besides. Nor do I neglect those which are already extant in the *Published Discourses* of diligent and inquisitive Men.

From all which Observations, joyned with those made by my self, I prove,

I. That there is a mighty *Collection of Water* inclosed in the *Bowels of the Earth*, constituting an *huge Orb* in the *interiour or central Parts* of it; upon the *Surface of which Orb of Water* the *terrestrial Strata* are expanded. That *this* is the same which *Moses* calls the *Great Deep*, or *Abyss*: the ancient *Gentile Writers*, *Erebus*, and *Tartarus*.

2. That the *Water* of this *Orb* *communicates* with *that of the Ocean*, by means of certain *Hiatus's* or *Chasmes* passing betwixt it and the bottom of the *Ocean*. That they have the same *common Center*, around which the *Water* of both

both of them is compiled and arranged; but in such manner, that the ordinary *Surface* of this *Orb* is not level with *that* of the *Ocean*, nor at so great a *Distance* from the *Center* as *that* is, it being for the most part restrained and *depressed* by the *Strata* of Earth lying upon it. But wherever those *Strata* are *broken*, or so *lax* and *porose* that *Water* can *pervade* them, there the *Water* of the said *Orb* does *ascend*: fills up all the *Fissures* whereinto it can get Admission or Entrance: and *saturates* all the Interstices and Pores of the Earth, Stone, or other Matter, all round the Globe, quite up to the *level* of the *Surface* of the *Ocean*.

That there is a perpetual and incessant *Circulation* of *Water* in the *Atmosphere*; it *arising* from the Globe in form of *Vapour*, and *falling* down again in *Rain*, *Dew*, *Hail*, and *Snow*. That the *quantity* of *Water* thus rising and falling is *equal*; as much *returning* back in *Rain*, &c. to the whole *terrestrial* *Globe*, as was *exhaled* from it in *Vapours*: and reciprocally as much *mounting* up again in *Vapour* as was *discharged* down in *Rain*. That tho' the *quantity* of *Water* thus rising and falling

falling be nearly certain and constant as to the *whole*, yet it varies in the several *Parts* of the *Globe*; by reason that the *Vapours* float in the *Atmosphere*, sailing in *Clouds* from place to place, and are not restored down again in a Perpendicular upon the *same* precise Tract of *Land*, or *Sea*, or *both* together, from which Originally they arose, but *any other* indifferently. So that *some Regions* receive back *more* in *Rain* than they send up in *Vapour*: as, on the contrary, *others* send up more in *Vapour* than they receive in *Rain*. Nay, the very *same Region* at one *Season* sends up *more* in *Vapours* than it receives in *Rain*: and at *another* receives *more* in *Rain* than it sends up in *Vapour*. But the *Excesses* of one *Region* and *Season* compensating the *Defects* of the others, the quantity *rising* and *falling* upon the *whole Globe* is *equal*; however *different* it may be in the several *Parts* of it.

4. That the *Rain* which falls upon the *Surface* of the *Earth* partly runs off into *Rivers*, and thence into the *Sea*: and partly *sinks* down into the *Earth*, insinuating it self into the *Interstices* of the *Sand*, *Gravel*, or other *Matter* of the
exte-

exteriour or uppermost *Strata*. Whence some of it passes on into *Wells*, and into *Grotts*, and *stagnates* there, till 'tis by degrees again *exhaled*. Some of it glides into the *perpendicular Intervalls* of the solid *Strata*; where, if there be no *Outlet* or *Passage* to the *Surface*, it *stagnates*, as the other: but if there be such *Outlets*, 'tis by them *refunded* forth together with the ordinary *Water* of *Springs* and *Rivers*. And the rest, which, by reason of the *compactness* of the *terrestrial Matter* underneath, cannot make its way to *Wells*, the *perpendicular Fissures*, or the like *Exits*, only *saturates* the uppermost *Strata*: and in time *remounts* up again in *Vapour* into the *Atmosphere*.

That although *Rains*, do thus fall into, and augment *Springs* and *Rivers*, yet neither *the one* nor *the other* do derive the *Water*, which they ordinarily refund, from *Rains*; notwithstanding what very many *Learned Men* have believed.

That *Springs* and *Rivers* do not proceed from *Vapours* raised out of the *Sea* by the *Sun*, borne thence by *Winds* unto *Mountains*, and there *condensed*; as a modern ingenious *Writer* is of Opinion.

7. That the abovementioned great subterranean Magazine the *Abyss*, with its Partner the *Ocean*, is the *Standing Fund* and *Promptuary* which supplies *Water* to the Surface of the Earth: as well *Springs* and *Rivers*, as *Vapours* and *Rain*.

8. That there is a nearly uniform and constant *Fire* or *Heat* || disseminated throughout the *Body* of the *Earth*, and especially the *interiour Parts* of it; the bottoms of the deeper *Mines* being very *sultry*, and the *Stone* and *Ores* there very sensibly *hot* even in *Winter*,

|| *Heat* and *Fire* differ but in Degree: and *Heat* is *Fire* only in lesser quantity. *Fire* I shall shew to be a Fluid consisting of *Parts* extremely small and light, and consequently very subtile, active, and susceptible of Motion. An Aggregate of these *Parts* in such number as to be visible to the *Eye*, is what we call *Flame* and *Fire*: a lesser, thinner, and more dispers'd Collection, *Heat* and *Warmth*.

and the colder Seasons. That 'tis this *Heat* which evaporates and elevates the *Water* of the *Abyss*, buoying it up indifferently on every side, and towards all parts of the *Surface* of the *Globe*: pervading not only the *Fissures* and *Intervalls* of the *Strata*, but the very *Bodies* of the *Strata* themselves, permeating the *Interstices* of the *Sand*, *Earth*, or other Matter, whereof they consist: yea even the most firm and dense

dense *Marble* and *Sand-stone*. For these give *Admission* to it, though in lesser quantity, and are always found *saturated* with it; which is the reason that they are *softer*, and cut much more easily, when *first* taken out of their *Beds* and *Quarries*, than afterwards, when they have lain some time exposed to the *Air*, and that *Humidity* is evaporated.

That this *Vapour* proceeds up *directly* towards the *Surface* of the *Globe* on *all sides*, and, as near as possible, in *right Lines*, unless *impeded* and *diverted* by the *Interposition* of *Strata* of *Marble*, the denser sorts of *Stone*, or other like *Matter*, which is so *close* and *compact* that it can admit it only in *smaller quantity*, and this very *slowly* and *leisurely*.

That where the *Vapour* is thus *intercepted* in its passage, and cannot penetrate the *Stratum* diametrically, *some* of it glides along the *lower Surface* of it, permeating the *horizontal Intervall* which is betwixt the said dense *Stratum* and that which lies underneath it. *The rest* passes the *Interstices* of the *Mass* of the *subjacent Strata*, whether they be of *laxer Stone*, of *Sand*, of *Marle*,

Marle, or the like, with a *Direction* parallel to the *Site* of those *Strata*, till it arrives at their *perpendicular Intervalls*.

That this *Water* being thus approach'd to these *Intervalls*, in case the *Strata*, whereby the ascending *Vapour* was collected and *condensed* into *Water* (as we usually speak) in like manner as by an *Alembick*, happen to be *raised* above the *level* of the *Earth's* ordinary *Surface*, as those *Strata* are whereof *Mountains* consist, then the *Water*, being likewise got *above* the *said level*, *flows forth* of those *Intervalls* or *Apertures*, and, if there be no *Obstacle* without, forms *Brooks* and *Rivers*. But where the *Strata*, which so *condense* it, are *not higher* than the *mean Surface* of the *Earth*, it *stagnates* at the *Apertures*, and only forms *standing-Springs*.

That though the *Supply* from this great *Receptacle* below be *continual*, and nearly the *same* at all *Seasons*, and *alike* to all *parts* of the *Globe*, yet when it arrives at or near the *Surface* of the *Earth*, where the *Heat* (the *Agent* which *evaporates* and *bears* it up) is *not so constant* and *uniform* as is that re-
fident

fidest *within* the *Globe*, but is subject to *Vicissitudes* and *Alterations*, being at certain *Seasons* greater than at others: being also greater in some *Climates* and *Parts* of the *Earth* than in others; it thence happens that the quantity of *Water* at the *Surface* of the *Earth*, though sent up from the *Abyss* with an almost constant *Equality*, is various and uncertain, as is the *Heat* there; at some *Seasons*, and in some *Countries*, the *Surface* abounding, and being even drowned with the plenty of it, the *Springs* full, and the *Rivers* high: at other *Seasons*, and in other *Countries*, both *Springs* and *Rivers* exceeding low, yea sometimes totally failing.

That when the *Heat* in the *exteriour* *Parts* of the *Earth*, and in the *ambient* *Air*, is as intense as that in the *interiour* *Parts* of it, that *Water* which passes the *Strata* directly, mounting up in separate *Parcels*, or in form of *Vapour*, does not stop at the *Surface*; because the *Heat* there is equal both in quantity and power to that underneath, which brought it out of the *Abyss*. This *Heat* therefore takes it here, and bears it up, part of it immediately out
at

at the *Surface* of the *Earth*: the *rest*, through the *Tubes* and *Vessels* of the *Vegetables* which grow thereon, *Herbs*, *Shrubs*, and *Trees*, and along with it a sort of *vegetative* terrestrial *Matter*, which it *detaches* from out the uppermost *Stratum* wherein these are planted. This it *deposes* in them, for their *Nutriments*, as it passes through them †: and issuing out at the *tops* and *extremities* of them, it marches still on, and is *elevated* up into the *Atmosphere* to such *height* that, the *Heat* being there *less*, it becomes *condensed*, unites and combines into small *Masses* or *Drops*, and at length falls down again in *Rain*, *Dew*, *Hail*, or *Snow*. *

And for the *Water*, which was *condensed* at the *Surface* of the *Earth*, and sent forth collectively into *Standing-Springs* and *Rivers*, this also sustains a *Diminution* from the *Heat* above; being *evaporated*, more or less, in proportion to the greater or lesser *Intenseness* of that *Heat*, and the greater or lesser *Extent* of the *Surface* of the *Water* so sent forth.

† *Vid. Conf.*
10. infra.

* As does likewise the other Part of it, that ascended in the open Air without, and did not thus pass thorough Vegetables.

That as these *Evaporations* are at some times greater, according to the greater heat of the *Sun*, so wherever they alight

alight again in *Rain*, 'tis as much superiour in *quantity* to the *Rain* of *colder Seasons*, as the *Sun's power* is *then* superiour to its power in *those* Seasons. This is apparent even in these *Northern Climes*, where the *Sun's power* is never very great; our *Rains* in *June, July, and August*, being much greater than *those* of the *colder Months*: the *Drops* larger, and consequently heavier: falling thicker, faster, and with greater force: striking the ground, at their fall, with violence, and making a mighty noise: beating down the *Fruit* from the *Trees*, prostrating and laying *Corn* growing in the *Fields*: and sometimes so filling the *Rivers* as to make them out swell their *Banks*, and lay the neighbouring *Grounds* under *Water*. But much more apparent is it in the more *Southern Regions*: in *Abassinia, Nigritia, Guinea*: in the *East-Indies*: in *Brasil, Paraguay*, and other *Countries of South America*, to instance in no more. In these the *Sun* shews a much greater force: and their *Rains* (which are *periodical*, happening always much about the *same time*, and lasting *several Months*) fall in such quantities as to be more like *Rivers* descend-

descending, than *Showers*. And by *these* are caused those mighty *periodical Inundations* of the *Nile*, the *Niger*, the *Rio da Volta*: the *Ganges*: the *Rio de las Amazonas*, the *Rio de la Plata*, and other *Rivers* of those *Countries*; to which *Inundation* *Egypt*, through which the *Nile* flows, the *Indies*, and the rest, owe their *extraordinary Fertility*, and those *mighty Crops* they produce after these *Waters* are withdrawn from off their *Fields*; *Rain-*

* *Pag. 46. water*, as we have already noted *, carrying along with it a sort of *terrestrial Matter* that *fertilizes* the *Land*, as being proper for the *Formation* of *Vegetables*.

† *Conf.*
pag. 124.

That when the *Heat* in the *exterior Parts* of the *Earth*, and in the *ambient Air*, is *less* than that in the *interiour*, the *Evaporations* are likewise *less*. And the *Springs* and *Rivers* thereupon do not only *cease* to be *diminished* †, in proportion to the *Relaxation* of the *Heat*, but are much *augmented*; a *great part* of the *Water*, which *ascends* to the *Surface* of the *Earth* in *Vapour*, *stopping* there, for want of *Heat* to *mount* it thence up into the *Atmosphere*, and *saturating* the *superficial* or

or uppermost *Strata* with *Water*; which by degrees drains down into *Wells*, *Springs*, and *Rivers*, and so makes an *Addition* unto them. And this is the reason that *these* abound with *Water* in the colder *Seasons* so much more than they do in the *hotter*.

That the *Water*, which is thus dispens'd to the *Earth* and *Atmosphere* by the *Great Abyss*, being carried down by *Rains* and by *Rivers* into the *Ocean*, which, as we have said, communicates, and stands at an *Æquilibrium* with the *Abyss*, is by that means restored back to that subterranean *Conservatory*; whence it returns again, in a continual *Circulation*, to the *Surface* of the *Earth*, in *Vapours*, and *Springs*. 9.

That the final Cause of this Distribution of *Water*, in such quantity, to all parts of the *Earth* indifferently in *Springs*, *Rivers*, and *Rain*: and of this perpetual *Circulation* and *Motion* of it, is the *Propagation* of *Bodies*, *Animals*, *Vegetables*, and *Minerals*, in a continued *Succession*. That for *Animals*, they either feed upon *Vegetables* immediately: or, which comes to the same at last, upon other *Animals* which have fed upon them. So that *Vegetables* 10.

bles are the first and *main Fund* : and *fit Matter* being supplied unto *these*, *Provision* is thereby made for the *Nourishment* of *Animals* ; *Vegetables* being no other than so many *Machines* serving to derive that *Matter* from the *Earth*, to digest and prepare it, for *their Use*, leisurely and by little and little, as they can admit and *dispose* of it, and as it is brought to them by the *Ministration* of *this Fluid*. That *Vegetables* being naturally *fix'd* and *tyed* always to the *same Place*, and so not able (as *Animals* are) to *shift*, and seek out after *Matter* proper for their *Increment*, 'twas indispensibly necessary that it should be *brought to them* : and that there should be some *Agent*, thus ready and at hand in *all places*, to do them that *Office* ; and so carry on this great and important *Work*. For this *Matter*, being impotent, sluggish, and *inactive*, hath no more power to *stir*, or *move* it self to *these Bodies*, than *they* themselves have to *move* unto it. So that it must have lain eternally confined to its *Beds of Earth*, and then none of these *Bodies* could ever have been *formed*, were there not *this*, or the like *Agent* to *educe* it *thence*,
and

and bear it unto them. Nor does the *Water*, thus hurried about from place to place, serve only to *carry* the *Matter* unto these *Bodies*, but the *Parts* of it being very *voluble* and *lubricous*, as well as *fine* and *small*, it easily *insinuates* it self into, and placidly *distends* the *Tubes* and *Vessels* of *Vegetables*, and by that means *introduced* into them the *Matter* it bears along with it, *conveying* it to the *several Parts* of them; where *each Part*, by a particular *Mechanism* in the *Structure* of it, *detaches* and *assumes* those *Particles* of the *Mass* so conveyed which are proper for the *Nutrition* and *Augmentation* of *that Part*, incorporated *these* with it, and letting all the *rest* pass on with the *Fluid*; those *Particles* which are either *superfluous*, and *more* than the *Parts* of the *Plant* can admit and manage at one time: or that are not *suitable* and proper for the *Nourishment* of any of the *Parts* of a *Plant* of *that kind*, going out at the *Extremities* of it along with the *Water* *. And this latter * Confer. Office it does likewise to *Animals*; pag. 124. *Water*, and other *Fluids*, serving to convey the *Matter*, whereby they are *nourished*, from their *Stomachs* and
K Guts;

Guts, through the *Lacteals* and finer *Vessels*, to the *several Parts* of their *Bodies*. But the *Formation* of *Animals* and *Vegetables*, being a thing somewhat foreign to my *present purpose*, I shall adjourn the fuller *Consideration* of it to another *Occasion*. How far *Water* is concerned in the *Formation* of *Minerals*, will appear more at large in the *succeeding Part* of *this Work*.

II. That'tis this *Vapour*, or *subtile Fluid*, that ascending thus incessantly out of the *Abys*s, and *pervading* the *Strata* of *Gravel*, *Sand*, *Earth*, *Stone*, and the rest, by degrees *rots* and *decays* the *Bones*, *Shells*, *Teeth*, and other *Parts* of *Animals*: as also the *Trees*, and other *Vegetables*, which were lodged in those *Strata* at the *Deluge*†; this *Fluid*, by its continual *Attrition*, as it passes successively by them, *fretting* the said *Bodies*, by little and little *wearing off* and *dissipating* their *constituent Corpuscles*, and at length quite *dissolving* and *destroying* their *Texture*. That yet it hath not *this Effect* indifferently upon all of them; those which happened to be reposed in the *firmer* and *compact*er *Strata*, e. g. of *Marble*, the *closer kinds* of *Sand-Stone*, *Chalk*, and the

† Part 2.
Conf. 3.

the like, being thereby *protected* in great measure from its *Attacks*. For it passes through these only in *lesser quantity*, and that *slowly*, and with *difficulty* *. So that its *Motion here* ^{*Vid. Conf. 8. supra.} being more *feeble* and *languid*, the *Shells* and other *Bodies* enclosed in these are usually found very *firm* and *entire*, many of them retaining even their *natural Colours* to this day, though they have lain thus above four thousand *years*: and may doubtless endure much *longer*, even as long as those *Strata*, to which they owe their *Preservation*, shall themselves *endure*, and continue *entire* and *undisturbed*. Whilst those which were lodg'd in *Marle*, *Sand*, *Gravel*, and the like more *loose* and *pervious* Matter, are so *rotted* and *decayed*, that they are now not at all, or very difficultly, distinguishable from the *Marle*, or other Matter in which they lye. Not but that there are sometimes found, even in these *laxer Strata*, *Shells*, *Teeth*, and other *Bodies* that are still tolerably *firm*: and that have escaped pretty safe. But *these* are only such as are of a more than ordinary *robust* and *durable Constitution*, whereby they were enabled the better to

withstand the repeated *Assaults* of the permeating *Fluid*, and to maintain their *Integrity*, whilst the other *tenderer* kinds *perish'd* and were *destroyed*.

* Confer.
Conf. 10.
supra.

That this *subtile Fluid* exerts the *same power* upon the *Surface* of the *Earth*, that it does in the *Bowels* of it. For as it is instrumental to the *Formation* of Bodies *here* *, so is it likewise (by a *different Operation*, which I have not room to describe in this place) of the *Destruction* of them. And that *Corrosion* and *Dissolution* of Bodies, even the most *solid* and *durable*, which is vulgarly ascrib'd to the *Air*, is caused meerly by the *Action* of this *Matter* upon them; the *Air* being so far from *injuring* and *preying* upon the Bodies it *environs*, that it contributes to their *Security* and *Preservation*, by *impeding* and *obstructing* the *Action* of this *Matter*. Were it not indeed for the *Interposition* of the *Air*, they could never be able to make so *long* and *vigorous Resistance* as now they do.

12.

That this *Subterranean Heat* or *Fire*, which thus *elevates* the *Water* out of the *Abys*s, being in any Part of the *Earth stop'd*, and so *diverted* from its
ordi-

ordinary course, by some accidental *Glut* or *Obstruction* in the *Pores* or *Passages* through which it used to *ascend* to the *Surface*: and being by that means preternaturally *assembled*, in *greater quantity* than usual, into *one Place*, it causes a great *Rarification* and *Intumescence* of the *Water* of the *Abyss*, putting it into very great *Com-motions* and *Disorders*. And at the *same time* making the like *Effort* upon the *Earth*, which is expanded upon the face of the *Abyss*, it occasions that *Agitation* and *Concussion* of it, which we call an *Earthquake*.

That this *Effort* is in some *Earth-quakes* so *vehement* that it *splits* and *tears* the *Earth*, making *Cracks* or *Chasmes* in it some *Miles* in length; which *open* at the *Instants* of the *Shocks*, and *close* again in the *Inter-valls* betwixt them. Nay, 'tis sometimes so extremely *violent*, that it plainly *forces* the *superincumbent Strata*: *breaks* them all throughout, and thereby perfectly *undermines* and *ruins* the *Foundations* of them. So that *these failing*, the *whole Tract*, as soon as ever the *Shock* is over, *sinks* down to rights into the *Abyss* underneath, and is *swal-*

lowed up by it; the *Water* thereof immediately *rising* up, and forming a *Lake* in the place where the said *Tract* before was. That several considerable *Tracts* of Land, and some with *Cities* and *Towns* standing upon them: as also *whole Mountains*, many of them very *large*, and of a *great height*, have been thus totally *swallowed up*.

That this *Effort* being made in *all Directions* indifferently: upwards, downwards, and on every side; the *Fire* dilating and expanding on *all hands*, and endeavouring, proportionably to the *quantity* and *strength* of it, to get room, and make its way through *all Obstacles*, falls as foul upon the *Water* of the *Abyss* beneath, as upon the *Earth* above; forcing it forth which way soever it can find *vent* or *passage*: as well through its *ordinary Exits*, *Wells*, *Springs*, and the *Outlets* of *Rivers*: as through the *Chasmes* then newly opened: through the *Camini* or *Spiracles* of *Aetna*, or other near *Vulcanoes*: and those *Hiatus's* at the *bottom* of the *Sea* †, whereby the *Abyss* below *opens* into it, and *communicates* with it.

† *Vid.*
Conf. 2.
supra.

That

That as the *Water* resident in the *Abyss* is, in all *Parts* of it, stored with a considerable *quantity* of *Heat*; and more especially in *those* where these extraordinary *Aggregations* of this *Fire* happen: so likewise is the *Water* which is thus *forced out* of it. Inasmuch that, when *thrown forth*, and *mix'd* with the *Waters* of *Wells*, of *Springs*, of *Rivers*, and the *Sea*, it renders them very sensibly *hot*.

That it is usually *expelled* forth in *vast quantities*: and with so great *Impetuosity* that it hath been seen to *spout up* out of *deep Wells*, and *fly forth*, at the *tops* of them, upon the face of the ground. With like *rapidity* comes it out of the *Sources* of *Rivers*; *filling* them so of a *sudden* as to make them *run over* their *Banks*, and *overflow* the neighbouring *Territories*, without so much as one drop of *Rain* falling into them, or any other concurrent *Water* to raise and augment them. That it *spues* out of the *Chasmes*, opened by the *Earthquake*, in great *abundance*: mounting up in mighty *Streams*, to an incredible *height* in the *Air*: and this oftentimes at many *Miles* distance from any *Sea*. That it likewise *flies*
K 4 *forth*

forth of the *Volcanoes* in vast *Floods*, and with wonderful *Violence*. That 'tis forced through the *Hiatus*'s at the bottom of the *Sea* with such *Vehemence*, that it puts the *Sea* immediately into the most horrible *Disorder* and *Perturbation* imaginable, even when there is not the least breath of *Wind* stirring, but all, till then, *calm* and *still*: making it rage and *roar* with a most hideous and amazing *Noise*: raising its *Surface* into prodigious *Waves*, and tossing and rowling them about in a very strange and furious manner: over-setting *Ships* in the *Harbours*, and sinking them to the bottom; with many other like *Outrages*. That 'tis refunded out of these *Hiatus*'s in such *Quantity* also that it makes a vast *Addition* to the *Water* of the *Sea*: raising it many *Fathoms* higher than ever it flows in the highest *Tides*, so as to pour it forth far beyond its usual *Bounds*, and make it *overwhelm* the adjacent *Country*. By this means ruining and destroying *Towns* and *Cities*: drowning both *Men* and *Cattle*: breaking the *Cables* of *Ships*, driving them from their *Anchors*, bearing them along with the *Inundation* several
Miles

Miles up into the *Country*, and there running them a-ground: stranding *Whales* likewise, and other great *Fishes*, and leaving them, at its *Return*, upon *dry Land*.

That these *Phænomena* are not *new*, or peculiar to the *Earthquakes* which have happened in *our times*, but have been observed in *all Ages*: and particularly these exorbitant *Commutations* of the *Water* of the *Globe*. This we may learn abundantly from the *Histories* of former *Times*: and 'twas for *this Reason* that many of the *Ancients* concluded, rightly enough, that *they* were caused by the *Impulses* and *Fluctuation* of *Water* in the *Bowels* of the *Earth*. And therefore they very frequently called *Neptune* Σεισυχθων, as also 'Εροσυχθων, 'Εροσίζαυθ, and Τιναντογογαιος; by all which *Epithets* they denoted his *Power* of *Shaking* the *Earth*. They supposed that he *presided* over all *Water* whatever, as well that *within* the *Earth*, as the *Sea*, and the rest upon it: and that the *Earth* was supported by *Water*, its *Foundations* being laid thereon. Upon which account it was that they bestowed upon him the *Cognomen* Γαῖνοχθ, or *Supporter* of the *Earth*,
and

and that of *Θεμισλιχθ*, or *The Sustainer of its Foundations*. They likewise believed that he, having a full *Sway* and *Command* over the *Water*, had Power to *still* and *compose* it, as well as to *move* and *disturb* it, and the *Earth*, by means of it. And therefore they also gave him the Name of *Ἀσφαλίς*, or *The Establisser*; under which Name several *Temples* were consecrated to him, and *Sacrifices* offered whenever an *Earthquake* happened, to pacifie and to appease him; requesting that he would allay the *Commotions* of the *Water*, secure the *Foundations* of the *Earth*, and put an end to the *Earthquake*.

¶ Conf.
Consect.
13. infra.

† vid.
Conf. 14.
infra.

That the *Fire* it self, which, being thus *assembled* and *pent up*, is the *Cause* of all these *Perturbations*, makes its *own way* also forth, by what *Passages* soever it can get vent: through the *Spiracles* of the next *Vulcano* ||: through the *Cracks* and *Openings* of the *Earth* above-mentioned: through the *Aper- tures* of *Springs*, especially those of the *Therma* †: or any other way that it can either find or make. And being thus *discharged*, the *Earthquake* ceaseth, till the *Cause* returns again, and a fresh

a fresh Collection of this *Fire* commits the same *Outrages* as before.

That there is sometimes in *Commotion* a Portion of the *Abys*s of that vast *Extent*, as to shake the *Earth* incumbent upon it for so very large a part of the *Globe* together, that the *Shock* is felt the *same Minute* precisely in *Countries* that are many hundreds of *Miles* distant from each other: and this even though they happen to be parted by the *Sea* lying betwixt them. Nay, there want not Instances of such an universal *Concussion* of the whole *Globe* as must needs imply an Agitation of the whole *Abys*s.

That though the *Abys*s be liable to these *Commotions* in all parts of it, and therefore no *Country* can be wholly exempted from the *Effects* of them; yet these *Effects* are no where very remarkable, nor are there usually any great *Damages* done by *Earthquakes*, except only in those *Countries* which are mountainous, and consequently stoney, and cavernous underneath*; and especially where the *Disposition* of the *Strata* is such that those *Caverns* open into the *Abys*s, and so freely admit and entertain the *Fire*, which assembling

* Vid.
Part 2.
Conf. 8.

bling therein, is the *Cause* of the *Shock*; it naturally steering its course *that way* where it finds the readiest *Reception*, which is towards these *Caverns*; this being indeed much the *Cause* of *Damps* in *Mines*, whereof more by and by. Besides that those Parts of the Earth which abound with *Strata* of *Stone*, or *Marble*, making the strongest *Opposition* to this *Effort*, are the most furiously *shattered*, and suffer much more by it than those which consist of *Gravel*, *Sand*, and the like *laxer Matter*, which more easily *give way*, and make not so great *resistance*; an *Event* observable not only in this, but all other *Explosions* whatever. But, above all, those *Countries*, which yield great store of *Sulphur* and *Nitre*, are by far the most *injured* and *incommoded* by *Earthquakes*; these *Minerals* constituting in the *Earth* a kind of *Natural Gunpowder*, which, taking fire, upon this *assembly* and *approach* of it, occasions that murmuring noise, that *subterranean Thunder* (if I may so speak) which is heard rumbling in the *Bowels* of the *Earth* during *Earthquakes*, and, by the assistance of its *explosive Power*, renders the *Shock* much

much greater, so as sometimes to make miserable Havock and Destruction. And 'tis for this reason that *Italy, Sicily, Anatolia*, and some parts of *Greece* have been so long and so often alarmed and harassed by *Earthquakes*; these Countries being all *Mountainous*, and *Cavernous*, abounding with *Stone* and *Marble*, and affording *Sulphur* and *Nitre* in great *Plenty*. But for a more particular *History* of the several *Phænomena* which precede, which accompany, and which follow after *Earthquakes*: for the *Causes* of those *Phænomena*: and for a more exact *Account* of the *Origine*, and the *Oeconomy* of this *subterranean Fire*, I must beg the Reader's *Patience* till the larger *Work* be made publick.

That *Ætna, Vesuvius, Hecla*, and the other *Volcanoes*, are only so many *Spiracles*, serving for the discharge of this *subterranean Fire*, when 'tis thus preternaturally assembled. That where there happens to be such a *Structure* and *Conformation* of the *interiour Parts* of the *Earth*: that the *Fire* may pass freely and without impediment from the *Caverns*, wherein it assembles, unto these *Spiracles*, it then readily

dily and easily gets out, from time to time, without shaking or disturbing the *Earth*. But where such *Communication* is wanting, or the *Passages* not sufficiently large and open, so that it cannot come at the said *Spiracles* without first forcing and removing all *Obstacles*, it heaves up and shocks the *Earth*, with greater or lesser *Impetuosity*, according as the quantity of the *Fire* thus assembled is greater or less; till it hath made its way to the Mouth of the *Vulcano*; where it rusheth forth, sometimes in mighty *Flames*, with great *Velocity*, and a terrible bellowing *Noise*. That therefore there are scarcely any *Countries*, that are much annoyed with *Earthquakes*, that have not one of these *Fiery Vents*. And these are constantly all in *Flames* whenever any *Earthquake* happens; they disgorging that *Fire*, which, whilst underneath, was the Cause of the Disaster. Indeed, were it not for these *Diverticula*, whereby it thus gains an *Exit*, 'twould rage in the *Bowels* of the *Earth* much more furiously, and make greater *Havock* then now it doth. So that though those *Countries*, where there are such *Vulcano's*, are usually,
more

more or less, troubled with *Earthquakes*; yet, were these *Vulcano's* wanting, they would be much more annoyed with them than now they are: yea in all probability to that degree, as to render the Earth, for a vast space around them, perfectly *uninhabitable*. In one word, so beneficial are these to the *Territories* where they are, that there do not want *Instances* of some which have been rescued and wholly delivered from *Earthquakes* by the breaking forth of a new *Vulcano* there; this continually discharging that Matter, which being till then barricaded up, and imprisoned in the Bowels of the Earth, was the occasion of very great and frequent *Calamities*. That most of these *Spiracles* perpetually and at all Seasons send forth *Fire*, more or less; and though it be sometimes so little that the Eye cannot discern it, yet even then, by a nearer Approach of the Body, may be discovered a copious and very sensible *Heat* continually issuing out.

That the *Therma*, *Natural Baths*, or *Hot-Springs*, do not owe their *Heat* to any *Colluctation* or *Effervescence* of the *Minerals* in them, as some *Naturalists*

* It is indeed by this very Heat that their Water is born unto them from out the Abyſs. Vid. Conf. 8. ſupra.

raliſts have believed: but to the before-mention'd *Subterranean Heat* or Fire. That theſe *Baths* continually *emitt* a *manifeſt* and very *ſenſible Heat*: nay ſome of them have been obſerved at ſome times to ſend forth an *actual* and *viſible Flame*. That not only theſe, but all other *Springs* whatever, have in them ſome degree of *Heat* *; (none of them ever *Freezing*, no not in the longeſt and ſevereſt *Froſts*) but more eſpecially thoſe which ariſe where there is ſuch a *Site* and *Diſpoſition* of the *Strata* within the *Earth* as gives free, and eaſie *Admiſſion* to this *Heat*, and favours its *Ascent* to the *Surface*; where *perſpiring forth* at the ſame *Outlets* with the *Water* of the *Spring*, it by that means *heats* it, more or leſs, as it chanceth to be diſpenſed forth in greater or leſſer *quantity*. That as the *Heat* of all *Springs* is owing to this *ſubterraneous Fire*, ſo wherever there are any *extraordinary Diſcharges* of this *Fire*, there alſo are the neighbouring *Springs* *hotter* than ordinary; witneſs the many *Hot-Springs* near *Ætna*, *Veſuvius*, *Hecla*, and all other *Vulcans*. That the *Heat* of the *Therma* is not *constant*, and always *alike*; the ſame

same Spring suffering at some times a very manifest *Failure* and *Remission* of its *Heat*: at others as manifest an *Addition* and *Encrease* of it; yea sometimes to that Excess as to make it *boil* and *bubble* with *extream Heat*, like *Water* when boiling over a *common Fire*. That particularly during *Earthquakes*, and *Eruptions of Vulcano's* †, when there is a more copious *Accession* of this *subterraneous Fire*, the *Thermæ* all thereabouts become much *hotter* than before: yielding also a far *greater Supply* of *Water* than they were wont to do: and a murmuring *Noise* is usually heard, below them, in the *Bowels* of the *Earth*. All which is occasioned meerly by the then rapid *Motion*, and *Ascent* of the *Fire*, in greater *plenty* than before, to the *Apertures* of these *Springs*.

† *vid. Conf.*
12. and
13. *supra.*

I have now finish'd the Account of *this Section*: and was just going to take off my hand here. But recollecting that in the foregoing Part of this Work || I promised some further *Proofs* || *Pag. 95.* of *Contrivance* in the *Structure* of the *Globe* we dwell upon: and such too as may satisfy any fair and unbiass'd Spectator that the *Framing* and *Com-*
L *position*

position of it out of the *Materials* of the *former Earth* was a *Work* of *Counsel* and *Sagacity*: a *Work* apparently above the highest reaches of *Chance*, or the Powers of *Nature*; and *this* being a proper place wherein to produce those *Proofs*, I shall give such Hints of them as the Brevity I am tyed up to will permit me, and then conclude.

* *Lib. 1.*
c. 9. 10 12. I am indeed well aware that the Author of the *Theory of the Earth* * differs very much from me in Opinion as to this matter. He will not allow that there are any such Signs of Art and Skill in the Make of the Present Globe as are here mentioned: or that there was so great Care, and such exact Measures taken in the re-fitting of it up again at the Deluge. He reckons it no other than an huge disorderly Pile of *Ruines and Rubbish*: and is very unwilling to believe that it was the Product of any Reasoning or Designing Agent. The Chanel of the Ocean appears to him *the most ghastly thing in Nature*, and he cannot at all admire its *beauty or elegance*: for 'tis, in his judgment, *as deformed and irregular as it is great*. And for the Caverns of the Earth, the Fissures and Breaches of the
Strata,

Strata, he cannot fancy that they were formed by any work of Nature, nor by any immediate Action of God, seeing there is neither use, that he can discover, nor beauty in this kind of Construction. Then for the Mountains, these, he says, are placed in no order one with another, that can either respect Use or Beauty, and do not consist of any proportion of Parts that is referable to any Design, or that hath the least foot steps of Art or Counsel. In fine, he thinks there are several things in the Terraqueous Globe that are rude and unseemly : and many that are superfluous. He looks upon it as incommodious, and as a broken and confused heap of Bodies, placed in no order to one another, nor with any correspondency or regularity of Parts : and it seems to him nothing better than a rude Lump, and a little dirty Planet. I have given his Opinion in his own Words, though I have upon all like Occasions taken a shorter Course, and contented my self with giving only the sense of others ; but this I have done here, least any Man should suspect that I mistake the Author's Sentiments, or do not represent them fairly.

Now though it were really so, that there were some such Eye-fores in our *Earth* as are here suggested: and that we could not presently find out all the Gayities and *Embelishments* that we might seek for in it, the matter would not be great: and we might very well be contented to take it as we find it. But after all the thing is in truth quite otherwise, and there are none of all these wanting: nor any such *Deformities* as are here imagined; but, on the contrary, so very many real Graces and *Beauties*, that 'tis no easie thing to overlook them all. Even this very variety of *Sea* and *Land*, of *Hill* and *Dale*, which is here reputed so inelegant and unbecoming, is indeed extremely charming and agreeable. Nor do I offer this as any private Fancy of my own, but as the *common Sense* of *Mankind*, who are the true and proper Judges in the Case; both the *Ancients* and *Moderns*, giving their Suffrages unanimously herein. Even the very *Heathens* themselves, have esteemed this *Variety* not only *ornamental* to the *Earth*, but a Proof of the *Wisdom* of the *Creator* of it, and *alledged* it as such; whereof more in due place.

And

And, as I cannot admitt that there is any thing *unhandsome* or *irregular*: so much less can I grant that there is any thing *incommodious* and *Artless*, or *useless* and *superfluous*, in the *Globe*. Were I at full Liberty to do it here, 'twould be no hard thing to make appear that there are no real Grounds for any such *Charge*. For how easie were it, by taking a minute and distinct Survey of the *Globe*, and of the very many and various *Limbs* and *Parts* of it, to shew that all these are ordered and digested with infinite *Exactness* and *Artifice*; each in such manner as may best serve to its *own* proper *End*, and to the *Use* of the *whole*? How easie were it to shew, that the *Rocks*, the *Mountains*, and the *Caverns*, against which these *Exceptions* are made, are of indispenfible *Use* and *Necessity*, as well to the *Earth* as to *Man* and other *Animals*, and even to all the rest of its *Productions*? That there are no such *Blemishes*, no *Defects*: nothing that might have been *altered* for the *better*: nothing *superfluous*: nothing *useless*, in all the whole *Composition*? and so finally trace out the numerous *Foot-steps* and *Marks* of the *Presence* and

Interposition of a most wise and intelligent *Artichect* throughout all this stupendous *Fabrick*? But I must reserve *this* for a fitter Opportunity, and content my self for the present with only giving some brief Intimations of it in the following *Propositions*. Namely,

That 'twas absolutely necessary for the *well being* both of the *Earth* it self, and of all *terrestrial Bodies*, that some of the *Strata* should *consolidate*, as they did, immediately after the *Subsidence* of their Matter at the *Deluge*: that *these* should afterwards be *broken* in certain places: and lastly, that they should be *dislocated*, some of them *elevated*, and others *depressed*.

* As Part 2. Conf. 4. That had not the *Strata* of Stone and Marble become *solid* *, but the Sand, or other Matter whereof they consist, continued *lax* and *incoherent*, and they consequently been as *pervious* as those of Marle, Gravel, and the like, the *Water* which rises out of the *Abys*s, for the Supply of *Springs* and *Rivers*, would not have *stop'd* at the *Surface* of the *Earth*, but *march'd* directly, and without impediment, up into the *Atmosphere*, in all parts of the *Globe*, wherever there was *Heat* enough in the

the Air to continue its *Ascent*, and buoy it up. So that there then must needs have been an universal *failure* and *want* of *Springs* and *Rivers* all the *Summer-Season*, in the *colder Climes*: and *all the Year* round in the *hotter*, and those that are near the *Æquator*, where there is much the greatest *need* of both the one and the other; and this meerly for want of the Interposition of such *dense* and *solid Strata*, to *arrest* the ascending *Vapour*, to stop it at the *Surface* of the *Earth*: and to *collect* and *condense* it there.

That though the *Strata* had become solid, so as to have condensed the rising *Vapour*, yet if they had not been *broken* also, || the *Water* must have lain eter- || As *Part*
nally *underneath* those *Strata*, without 2. *Conf.* 6.
ever *coming forth*. And consequently there then could have been neither *Springs* nor *Rivers* for a very considerable part, or indeed, almost the whole *Earth*; the *Water*, which supplies these, proceeding out at those *Breaches* *. * *Conf.* 8.
This *Water* therefore would have been *supra*.
wholly *intercepted*, all lock'd up within the *Earth*, and its *Egress* utterly debarr'd, had the *Strata* of *Stone* and *Marble* remained *continuous*, and
L 4 with-

† Part 4.
Conf. 5.

without such *Fissures* and *Interruptions*. That these *Fissures* have a still further Use, and serve for *Receptacles* of *Metalls*, and of several sorts of *Minerals*; which are *arrested* by the *Water* in its passage thither through the *Strata* wherein the single *Corpuscles* of those *Metalls* and *Minerals* were lodged †: and borne along with it into these *Fissures*; where, being by this means collected, they are kept in store for the Use of Mankind.

|| Part 2.
Conf. 6, 7,
8.

That though there had been both *solid Strata* to have *condens'd* the ascending Vapour: and *those* so broken too as to have given free *Vent* and *Issue* to the *Water* so condensed; yet had not the said *Strata* been *dislocated* likewise ||: some of them *elevated*, and others *depress'd*, there would have been no *Cavity* or *Chanel* to give Reception to the *Water* of the *Sea*: no *Rocks*, *Mountains*, or other *Inequalities* in the *Globe*. And without these, the *Water*, which now *arises* out of it, must have all *stagnated* at the *Surface*, and could never possibly have been *refunded forth* upon the *Earth*: nor would there have been any *Rivers*, or *running Streams*, upon the face of the

the *whole Globe*, had not the *Strata* been thus *raised up*, and the *Hills exalted* above the neighbouring *Valleys* and *Plains*; whereby the *Heads* and *Sources* of *Rivers*, which are in those *Hills*, were also *borne up* above the ordinary *Level* of the *Earth*, so as that they may *flow* upon a *Descent*, or an *inclining Plane*, without which they could not *flow* at all †.

† Conf.
Conf. 8.
supra.

That this *Affair* was not transacted unadvisedly, casually, or at random: but with due *Conduct*, and just *Measures*. That the *Quantity* of Matter consolidated: the *Number*, *Capacity*, and *Distances* of the *Fissures*: the *Situation*, *Magnitude*, and *Number* of the *Hills*, for the condensing, and discharging forth the *Water*: and, in a word, all other things were so ordered that they might *best* conduce to the *End* whereunto they were *designed* and *ordained*. There was such *provision* made that a *Country* should not want so many *Springs* and *Rivers* as were *convenient* and *requisite* for it: nor, on the other hand, be *over-run* with them, and afford little or nothing else; but that there should be a *Supply* every where ready, *suitable* to the *Necessities* and

and *Expences* of each *Climate* and *Region* of the *Globe*. For example, those *Countries* which lye in the *Torrid Zone*, and under or near the *Line*, where the *Heat* is very great, are furnished with *Mountains* answerable : *Mountains* which both for *Bigness* and *Number* surpass those of *colder Countries* as much as the *Heat* there surpasses that of those *Countries*. Witness the *Andes*, that prodigious *Chain* of *Mountains* in *South America* : *Atlas* in *Africa* : *Taurus* in *Asia* : the *Alpes* and *Pyrenees* of *Europe*, to mention no more. By these is collected and dispensed forth a quantity of *Water* proportionable to the *Heat* of those *Parts*. So that although, by reason of the *Excess* of this *Heat* there, the *Evaporations* from the *Springs* and *Rivers* are very great ; yet they, being, by these larger *Supplies*, continually stock'd with an *Excess* of *Water* as great, yield a *Mass* of it for the *Use* of *Mankind*, the *Inhabitants* of those *Parts*, of the other *Animals*, and of *Vegetables*, not much, if at all, inferiour to the *Springs* and *Rivers* of *colder Climates*. That besides this, the *Waters* thus evaporated and mounted up into the *Air*, thicken and cool it,

it, and, by their *Interposition* betwixt the *Earth*, and the *Sun*, skreen and fence off the *ardent Heat* of it, which would be otherwise *unsupportable*: and are at last returned down again in copious and fruitful *Showers* to the *scorched Earth*; which, were it not for this remarkably *Providential Contrivance* of Things, would have been there perfectly *uninhabitable*: labour-ed under an eternal *Drought*: and have been continually *parched* and *burnt*.

To this former Section I shall add, by way of Appendix,

A Dissertation concerning the *Flux and Reflex of the Sea*: and its other Natural *Motions*; with an Account of the *Cause* of those *Motions*: as also of the *End* and *Use* of them: and an Enquiry touching the *Cause* of the *Ebbing* and *Flowing*, and some other uncommon *Phænomena* of certain *Springs*. 1.

A Discourse concerning the *Saltness* of the *Sea*. 2.

A Discourse concerning *Wind*: the *Origin*, and *Use* of it in the Natural World. 3.

PART III. SECT. II.

*Of the Universality of the Deluge.
Of the Water which effected it.
Together with some further Particulars concerning it.*

IN the precedent Section I consider the *present* and *natural State* of the *Fluids* of the *Globe*. I ranfack the feveral Caverns of the *Earth*: and fearch into the Storehoufes of *Water*; and this principally in order to find out where that mighty *Mass* of *Water* which *overflowed* the *whole Earth* in the days of *Noah*, is *now* beftowed and concealed: as alfo which way 'tis at *this time* ufeul to the *Earth* and its *Productions*, and ferviceable to the *present Purpofes* of Almighty *Providence*.

Such a *Deluge* as that which *Moses* represents, whereby *All the high Hills that were under the whole Heaven* were
 † *Gen. 7. covered* †, would require a portentous
 19. quantity of *Water*; and Men of *Curiofity*, in all Ages, have been very
 much

much to seek what was become of it, or where it could ever find a *Reservatory* capable of containing it. 'Tis true there have been several who have gone about to inform them, and set them to rights in this Matter; but for want of that Knowledge of the *present System of Nature*: and that insight into the *Structure and Constitution* of the *Terraqueous Globe*, which was necessary for such an Undertaking, they have not given the Satisfaction that was expected. So far from it that the *greatest part* of these, seeing no where Water enough to effect a *General Deluge*, were forced at last to mince the Matter, and make only a *Partial* one of it; restraining it to one *single Country*: to *Asia*, or some lesser portion of Land; than which, nothing can be more contrary to the *Mosaick Narrative*.

For *the rest*, they had recourse to *Shifts* which were not much better: and rather evaded than solved the *Difficulty*; some of them imagining that a quantity of Water, sufficient to make such a *Deluge*, was *created* upon that Occasion: and, when the business was done, all disbanded again and *annihilated*.

ted. Others supposed a *Conversion* of the *Air* and *Atmosphere* into *Water*, to serve the turn. Many of them were for fetching down I know not what *supercaelestial Waters* for the purpose. Others concluded that the *Deluge* rose only *fifteen Cubits* above the *Level* of the Earth's *ordinary Surface*, covering the *Valleys* and *Plains*, but not the *Mountains*; all equally wide of *Truth*, and of the Mind of the *Sacred Writer*.

One of the last *Undertakers* of all seeing this, began to think the *Cause* desperate; and therefore, in effect, gives it up. For considering how unsuccessful the Attempts of those who were gone before him had proved: and having himself * also employed his last and utmost endeavours to find out *Waters* for the *Vulgar Deluge*; having mustered up all the Forces he could think of, and all too little: *The Clouds* above, and the *Deep's* below, and in the bowels of the *Earth*; and these, says he, are all the *Stores* we have for *Water*, and *Moses* directs us to no other for the *Causes* of the *Deluge*; he prepares for a *Surrender*, asserting, from a mistaken and defective *Computation*, that all these will not come up to near the quan-

* *Theory of*
Earth, l. 1.
c. 2.

quantity requisite: and that *in any known parts of the Universe, to find Water sufficient for this effect, as it is generally explained and understood, is, he thinks, impossible*: that is, sufficient to cause a *Deluge*, to use his own Words, *overflowing the whole Earth, the whole Circuit, and whole Extent of it, burying all in Water, even the greatest Mountains*: which is, in plain terms, such a one as was *explained and understood by Moses, and the Generality of Writers since.*

Having therefore thus over-hastily concluded that such a *Deluge* was *impossible*: and that all Nature could not afford Water enough to drown the *whole Globe*, if of the *Circuit and Extent* that now it is; he flies to a new *Expedient* to solve the Matter, and supposes an *Earth* of a *Make and Frame* much like that imaginary one of the Famous Monsieur *Des Cartes**, which he makes to fall all to pieces, at the *Deluge*, and to contract it self into a lesser room, that the *Water* might the better surround and encompass it.

* *Princ. Philos.* l. 4.

The sober and better sort of the *Standers-by*, and those who were *Well-wishers to Moses*, began to be under

under some Concern and Uneasiness to see him thus set aside only to make way for a *new Hypothesis*: and so *serious* and *weighty* a *Matter*, as is this Tradition of the *Universal Deluge*, plac'd after all upon so very unsteady a *Bottom*. But that *Concern* encreas'd when they further heard him so zealously decrying all former *Notions* of a *Deluge*: refusing to grant one upon any *Terms* but his own: and so peremptorily declaring, *That all other ways assigned for the Explication of Noah's Flood are false or impossible*. This was to reduce the Thing to a very great *Strait*: and surely an exposing and venturing of it a little too far. For, if all the other *Ways* be *false* and *impossible*, should *this*, the only one left, prove at last so likewise, the *Opinion* of a *Deluge* would be left very precarious and defenceless: and we might either believe or disbelieve it at pleasure. Nay the *negative Part* would of the two have much the *Advantage*; there being no reasonable *Foundation* to believe that the *Deluge* did come to pass *this way*.

Some Men there are who have made a very untoward use of *this*: and such
a one

a one that I am willing to persuade my self he never intended they should; yet it were to have been wish'd that he had been somewhat more wary. These cryed up his *Computation* of the *Water* as indisputable and infallible: and then boldly gave out that such a *Deluge* as that described by *Moses* was altogether incredible, and that there never was nor could be any such Thing. Nothing was talk'd of amongst them under Mathematical Demonstrations of the *Falshood* of it; which they vented with all imaginable Triumph, and would needs have it that they had here sprung a fresh and unanswerable *Argument* against the *Authentickness* of the *Mosaick Writings*; which indeed is what they drive at, and a *Point* they very fain would gain.

For my part, my *Subject* does not necessarily oblige me to look after this *Water*: or to point forth the *Place* whereunto 'tis now retreated. For when, from the *Sea-shells*, and other *Remains* of the *Deluge*, I shall have given undeniable *Evidence* that it did actually cover all *Parts* of the *Earth*; it must needs follow that there was *then* *Water enough* to do it, wherever it

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may

may be *now* hid, or whether it be *still* in *being* or not. Yet the more effectually to put a stop to the *Insults* and *Detractions* of these vain *Men*, I resolved to enter a little farther into the Examination of this Matter. Which produced the *former Section* of this 3d *Part*, wherein I enquire what *proportion* the *Water* of the *Globe* bears to the *Earthy Matter* of it. And upon a moderate *Estimate* and *Calculation* of the *Quantity* of *Water* now actually contained in the *Abys*s, I found that *this alone* was *full enough*, if brought out upon the *Surface* of the *Earth*, to cover the *whole Globe* to the height assigned by *Moses*; which is, *fifteen Cubits* above the *Tops* of the *highest Mountains*. * The Particulars of which *Calculation*, shall be laid before the Reader at *length* in the *Larger Work*. For any one will easily see that there is so great an *Apparatus* of Things only *previous*, which must needs be *adjusted* before I can come to the *Calculation* it self; that to descend to Particulars *here*, further than I have already || done, would not only carry *this Discourse* out beyond all reasonable *Bounds*, and make the *Parts* of it *disproportionate* to

* Gen. vii.
20.

|| Conf.
Sect. I:
Conf. 12.

to each other: but, which is not less to be thought of, would be an *Anticipation* of the *Other Work*.

This done, I again set aside the *Observations* about the *Fluids* of the *Globe*, introduced upon this *Occasion* in the *other Section*, as now of no farther use; and *reassume* the *Thread* of the *other Observations* which I propose at the *Beginning* of *this Work*; and from them I shew,

That the *Deluge* was *Universal*, and laid the *whole Earth* under *Water*; covering all, even the *highest Mountains*, quite round the *Globe*.

That, at the time of the *Deluge*, the *Water* of the *Ocean* was first born forth upon the *Earth*: that it was immediately succeeded by *that* of the *Abys*; which likewise was brought out upon the *Surface* of the *Globe*.

That upon the *Disruption* of the *Strata*: and the *Elevation* of some, and *Depression* of others of them, which followed after that *Disruption*, towards the latter end of the *Deluge* †, this † *Part 2.*
Mass of *Water* fell back again into the *depre*st and *lower Parts* of the *Earth*: into *Lakes* and other *Cavities*: into the *Alveus* of the *Ocean*: and, through the

Fissures whereby *this* communicates
 * *Señ. 1.* with the *Ocean**, into the *Abyss*;
supra. which it filled till it came to an *Æqui-*
Conf. 2. *librium* with the *Ocean*.

4. That there must have pass'd a considerable number of *Years* betwixt the *Creation* and the *Deluge*: and most probably about so many as *Moses* hath assigned.

5. That the *Deluge* commenc'd in the
 † *Confer.* *Spring-season*: the *Water* coming forth
Part 6. upon the *Earth* in the *Month* which
sub finem. we call *May* †.

6. That not only *Men*, *Quadrupeds*, *Birds*, *Serpents*, and *Insects*, the *Inhabitants* of the *Earth* and *Air*: but the far *greatest part* of all kinds of *Fish* likewise, the *Inhabitants* of the *Sea*, of *Lakes*, and of *Rivers*, *suffered* under the *Fury* of the *Deluge*, and were *kill- ed* and *destroyed* by it.

7. That the *Deluge* did not happen from an accidental *Concourse* of *Natural Causes*, as the *Author* above-cited is
 || *Theory of* of *Opinion* ||. That very many *Things*
the Earth. were then certainly done, which never
l. i. c. 6. 8. possibly could have been done without
 &c. the *Assistance* of a *Supernatural Power*.
 That the said *Power* acted in this *Mat- ter* with *Design*, and with the highest
Wisdom.

Wisdom. And that, as the *System* of *Nature* was *then*, and is *still* supported and established, a *Deluge* neither could *then*, nor can *now*, happen *naturally*.

I close up this Section with *two additional Discourses*,

The first concerning the *Migration of Nations*: with the several *Steps* whereby the *World* was *re-peopled* after the *Deluge* by the *Posterity* of *Noah*, and particularly that mighty Tract of *America*. Wherein I shall make out,
1. *Who* they were that first peopled it. 2. *When* they departed thitherwards. 3. *What Course* they took: and by *what means* both *Men* and *Beasts*, as well as *Serpents* and the other noxious and more intractible kinds of them, as the more innocent and useful, got thither. 4. Whether there remain any certain *Vestigia* of a *Tradition*, in the *Writings* of the *Ancients*, about these *Americans*: and what *Country* they intended under the Name of *Atlantis*. 5. Whether the *Phenicians*, or any other Nation of the *old World*, maintained anciently any *Commerce* or *Correspondence* with them. 6. How it happened that both the *Inhabitants*

of *that*, and of *our World*, lost all *Memory* of their *Commigration* hence.

7. Whence came the *Difference* in *Person*, or in the external *Shape* and *Lineaments* of the *Body*: in *Language*: in *Dyet*, and manner of *Living*: in *Clothing*: in *Arts* and *Sciences*: in *Customs*, Religious, Civil, and Military, betwixt these *Americans*, and their old Relations in *Asia*, *Europe*, and *Africa*. With Animadversions on the Writings of *Grotius*, *De Laet*, *Hornius*, and others, upon *this Subject*.

The Second concerning the unanimous *Tradition* of an *Universal Deluge* amongst all the most *ancient Gentile Nations*; particularly the *Scythians*, the *Persians*, and *Babylonians*: the *Bithynians*, *Phrygians*, *Lydians*, *Cilicians*, and other People of *Asia Minor*: the *Hierapolitans*, *Phœnicians*, and other Inhabitants of *Syria*: the *Ægyptians*, *Carthaginians*, and other *African Nations*: the most ancient Inhabitants of the several Parts of *Greece*: and of the other Countries of *Europe*: the old *Germans*: the *Gauls*: the *Romans*: the ancient Inhabitants of *Spain*: and even the *Britains* themselves, the first Inhabiters of this Island; proving that the great *Devastation*

vastation and Havock the *Deluge* made, both of the *Earth* it self, of the Generality of *Mankind*, of *Brutes*, and all *Animals*, had wrought a deep and very sensible *Impression* upon the Minds of these *ancient Nations*, who lived nearer to the *Time* of it. That they had not only a *Memory* and *Tradition* of it in *general* and *at large*: but even of several the most remarkable particular *Accidents* of it likewise; which they handed downwards, to the *succeeding Ages*, for some time, with Notes of the greatest Terror, Amazement and Consternation expressible. That it was commemorated chiefly by certain *Religious Rites* and *Ceremonies* used by them in the *Worship* of the E A R T H. Which Superstitious *Adoration* was first instituted upon *this Occasion*, in those simple and ignorant Ages †, and address'd to the † *vid.* *Earth*, not only *expresly* and by *Name*, ^{pag. 55.} but also under the feigned and bor- ^{seq. ut} ^{pag. 95.} rowed Names of *Atargatis*, *Derceto*, *Astarte*, *Dea Syria*, *Herthus*, *Isis*, *Magna Mater*, *Cybele*, and *Rhea*, with several more; by all which, they intended the *Earth*. That at length the *Tradition*, for want of *Letters*,
M 4 which

which were not then *invented*, or some other like means to *preserve* it, *wearing* out: and the *Reason* of the Institution of this *Worship* being by degrees *forgot*, the *After-Ages* perverted it to a somewhat different *Sense* and *Intention*; supposing that this was only a reverential *Duty* and *Gratitude* paid to the *Earth* as the *Common Parent* of *Mankind*, and because both *Man*, and all other *Creatures* proceed out of it. By which means the *true Notion* of the *Institution* being *lost*, the *Tradition* of the *Deluge*, which was couched under it, was also thereupon at length *suspended* and *lost*; few or none of all these many *Nations*, in the *latter Ages* of the *World*, having any *Memory* or *Knowledge* of it, besides what they afterwards recovered from the *Jews* and *ancient Christians*, who had it from the *Writings* of *Moses*. In *Greece* indeed there were some other *Accidents* which perplex'd and impeded the *Tradition* of it in that *Country*, whereof

† Part 1.
pag. 67.

I have already † given such Hints as this Discourse will bear.

PART

PART IV.

*Of the Origin and Formation of
Metalls and Minerals.*

WHat I can advance, with competent Certainty, about the *Fluids* of the *Globe*: the Sea, Springs, Rivers, and Rain, I propose in the immediatly foregoing or Third Part of this *Essay*. As in the Second Part of it I dispatch the *Solids*: Stone, Marble, Gravel, and all the other *Terrestrial Matter* of it, which is digested into *Strata*. That Part therefore comprehends the far greater share of that Matter: and indeed all, excepting only *Metalls* and *Minerals*; which are found much more sparingly, and in lesser *Parcels*; being either *enclosed* in those *Strata* (lying amongst the Sand, Earth, or other Matter whereof they consist) or contained in their *perpendicular Fissures*. And these remaining
still

still to be considered, I have allotted this *Fourth Part* to that Purpose.

To write of *Metalls* and *Minerals* intelligibly and with tolerable perspicuity, is a Task much more difficult than to write of either *Animals* or *Vegetables*. For those carry along with them such plain and evident *Notes* and *Characters* either of Disagreement, or Affinity with one another, that the several *Kinds* of them, and the subordinate *Species* of each, are easily known and distinguish'd, even at first sight; the Eye alone being fully capable of judging and determining their mutual *Relations*, as well as their *Differences*.

But in the *Mineral Kingdom* the Matter is quite otherwise. Here is nothing *regular*, whatever some may have pretended: nothing *constant* or *certain*. Infomuch that a Man had need to have all his Senses about him: to use repeated Tryals and Inspections, and that with all imaginable Care and Wariness, truly and rightly to discern and distinguish Things, and all little enough too. Here are such a vast variety of *Phænomena*: and those, many of them, so delusive, that 'tis very hard to escape Imposition and Mistake.

Colour,

Colour, or outward Appearance, is not at all to be trusted. A common *Marcasite* or *Pyrites* shall have the Colour of *Gold* most exactly: and shine with all the Brightness of it; and yet upon tryal, after all, yield nothing of worth, but *Vitriol*, and a little *Sulphur*; whilst another Body, that hath only the Resemblance of an ordinary *Peble*, shall yield a considerable quantity of *Metallick* and valuable Matter. So likewise a Mass, which, to the Eye, appears to be nothing but meer simple *Earth*, shall, to the Smell or Taste, discover a plentiful Admixture of *Sulphur*, *Alum*, or some other *Mineral*.

Nor may we with much better Security rely upon *Figure*, or external *Form*. Nothing more uncertain and varying. 'Tis usual to meet with the very same *Metall*, or *Mineral*, naturally shot into quite different *Figures*: as 'tis to find quite different kinds of them all of the same *Figure*. And a Body, that has the shape and appearance of a *Diamond*, may prove, upon Examination, to be nothing but *Crystal*, or *Selenites*: nay perhaps only common *Salt*, or *Alum*, naturally crystallized and shot into that *Form*.

So

So likewise if we look into their *Situation*, and *Place* in the Earth; sometimes we find them in the *perpendicular Intervalls*: sometimes in the *Bodies* of the *Strata*, being interspers'd amongst the *Matter* whereof they consist: and sometimes in both. Even the *gemmeous Matter* itself; (if I may so speak) with this only difference, that those *Gemms*, e. g. *Topazes*, *Amethyfts*, or *Emeralds*, which grow in the *Fissures*, are ordinarily *crystallized*, or shot into *angulated Figures*: whereas in the *Strata* they are found in *rude Lumps*, and only like so many yellow, purple, and green *Pebles*. Not but that even these that are thus lodged

† The *Crystallized Bodies* found in the perpendicular Intervalls are easily known from those which are lodged in the *Strata*, even by one who did not take them thence, or observe them there. The

former have always their *Root*, (as the *Jewellers* call it) which is only the *Abruptness* at that End of the Body whereby it adhered to the *Stone*, or *Sides* of the Intervalls; which *Abruptness* is caused by its being broke off from the said *Stone*. Those which are found in the *Strata* of *Earth*, *Sand*, or the like, (having lain loose therein) are intire, and want that Mark of *Adhesion*. But those which are inclosed in *Stone*, *Marble*, or such other solid Matter, being difficultly separable from it, because of its *Adhesion* to all sides of them, have commonly some of that Matter still adhering to them, or at least Marks of its *Abruption* from them, on all their sides; wherein these differ from those found in the perpendicular Intervalls, they adhering, as we have noted, by only one End. Vid. *Conf. 6. &c. infra.*

in the *Strata* are also sometimes found *crystallized* †, and in form of *Cubes*,

Rhombs,

Rhombs, and the like *. Or if we have respect to the *terrestrial Matter* wherein they lye in those *Strata*, here we shall meet with the same *Metall* or *Mineral* embodied in *Stone*, or lodged in *Cole*, that elsewhere we found in *Marle*, in *Clay*, or in *Chalk* ||.

* *Vid.*
Conf. 2.
infra.

As much Inconstancy and *Confusion* is there in their *Mixtures* with each other, or their *Combinations* amongst themselves. For 'tis rare to find any of them *pure*, *simple*, and *unmixt*; but *Copper* and *Iron* together in the same *Mass*: *Copper* and *Gold*: *Silver* and *Lead*: *Tin* and *Lead*: yea sometimes all the six *promiscuously* in one *Lump*. 'Tis the same also in *Minerals*; *Nitre* with *Vitriol*: *Common Salt* with *Alum*: *Antimony* with *Sulphur*, and sometimes all these together. Nor do *Metalls* only sort and herd with *Metalls* in the *Earth*: and *Minerals* with *Minerals*: but both indifferently and in common together. *Lead*, with *Spar*, or with *Antimony*: *Iron* with *Vitriol*, with *Alum*, with *Sulphur*: *Copper* with *Sulphur*, with *Vitriol*, &c. yea *Iron*, *Copper*, *Lead*, *Nitre*, *Sulphur*, *Vitriol*, and perhaps some more, in one and the same *Mass*. In a word, the only stand-

|| *Vid.*
Consect. 3.
infra.

standing *Test*, and discriminative *Characteristic* of any *Metall* or *Mineral* must be sought for in the *constituent Matter* of it: and it must be first brought down to *that* before any certain *Judgment* can be given. And when that is once done, and the several kinds *separated* and *extracted* each from the other, an homogeneous *Mass* of one kind is easily distinguishable from any other: Gold from Iron: Sulphur from Nitre: and so of the rest. But without *this*, so various are their *Intermixtures*, and so different the *Face* and *Appearance* of each, because of that *Variety*, that scarcely any thing can be certainly determined of the particular *Contents* of any single *Mass* of *Ore* by meer *Inspection*. I know that by *Experience* and *Conversation* with these *Bodies*, in any *Place* or *Mine*, a Man may be enabled to give a near *Conjecture* at the *Metallick* or *Mineral Ingredients* of any *Mass* commonly found there; but this meerly because he hath before made tryal of *other like Masses*, and thereby learned what it is they contain. But if he remove to *another Place*, though perhaps very little distant, 'tis ten to one but he meets with
so

so different a *Face of Things*, that he'll be there as far to seek in his *Conjectures* as one who never before saw a *native Ore* ; untill he hath here made his *try-als* as before, and so further informed himself in the matter.

Metalls being so very useful and serviceable to *Mankind*, great Care and Pains hath been taken, in all Ages, in *searching* after them, and in *separating* and *refining* of them. For which reason 'tis that *these* have been accurately enough *distinguish'd*, and reduced to *six kinds* ; which are all well enough known. But the like pains hath not been taken in *Minerals* ; and therefore the Knowledge of *them* is somewhat more confused and obscure. *These* have not yet been well reduced, or the *number* of the *simple original* ones rightly fixt ; *some*, which are only *Compounds*, the Matter of two or more *Kinds* being *mix'd* together, and, by the different *Proportion* and *Modulation* of that Matter, variously *disguised* and *diversified*, having been reputed all *different kinds* of *Minerals*, and thereby the *Number* of them unnecessarily *multiplied*. Of this we have an *Instance* in the *Gemm-kind* ;
where,

where, of all the *many sorts* reckoned up by *Lapidaries*, there are not above *three or four* that are *Originals*; their *Diversities*, as to *Lustre*, *Colour*, and *Hardness*, arising from the different *Admixture* of other *adventitious Metallick* and *Mineral Matter*. But the farther and clearer Adjustment of *this Affair* I am constrained to adjourn to the *larger Treatise*.

In the mean time 'tis sufficient for my *present Design*, to remark in general, that those *Minerals* and *Ores* of *Metalls* which are repositied in the *Bodies* of the *Strata*, are either found in *Grains*, or small *Particles*, dispersedly *intermix'd* with the *Corpuscles* of *Earth*, *Sand*, or other *Matter* of those *Strata*: or else they are *amass'd* into *Balls*, *Lumps*, or *Nodules*. Which *Nodules* are either of an *irregular* and *uncertain Figure*, such as are the common *Pyritæ*: *Flints*, *Agates*, *Onyx's*: *Pebbles*, *Cornelions*, *Jaspers*, and the like: or of a *Figure* somewhat more *regular* and *observable*, such as the *Belemnites*: the several sorts of *Mineral Coral*, of the *Stelechites*, and of the *Lapis Mycetoides* *: the *Astroites*, or *Starry-Stone*, as well that sort with the *Prominent*, as that with

* Vulgarly
call'd Fun-
gites.

with the *Plane*, and with the *Concave Stars*: the *Selenites*: the *Echinated Crystalline Balls*, with many more analogous Bodies.

Those which are contained in the *Perpendicular Intervalls* of the *Strata* are, either such as are there accumulated into a *rude Heap*, without any particular *Form* or *Order*, being only included betwixt the two *opposite Walls* or *Sides* of the said *Intervalls*, which they wholly or partly fill, as there is a greater or less *quantity* of them; in which manner *Spar* is usually found herein, and other *Minerals*, as also the common *Ores* of *Lead*, *Tin*, *Iron*, and other *Metalls*: or else such as are of some *observable Figure*. Of this sort are the *Sparry Stiria*, or *Iceycles* called *Stalactitæ* *: the *Native Saline Iceycles*, or *Sal Stalacticum*: the *Vitriolum Stalacticum Nativum*: the *Vitriolum Capillare*: the *Alumen Stalacticum*, and *Capillare*: *Minera ferri Stalactica*, which, when several of the *Cylindrick Stiria* are contiguous, and grow together into one *Sheaf*, is called *Brush-Iron-Ore*: and lastly the *Argentum Arborescens*, & *Capillare*. Hither also ought to be refer'd the *Crystallized Ores and Minerals*,
e. g.

*. or rather
Stagonitæ.

e. g. the *Iron-Rhombs*, the *Tin Grains*: the *Mundick-Grains*: *Crystallized Native Salt*, *Alum*, *Vitriol*, and *Sulphur*. As likewise the *Gemms* or *Stones* that are found in these *perpendicular Intervals* shot into *Cubes*, into *Pyramidal Forms*, or into *angulated Columns*, consisting sometimes of *three*, but most commonly of *six Sides*, and mucronated or terminating in a *Point*: being either *opake*, or *pellucid*: or partly pellucid, and partly opake, and coloured, black, white, grey, red, purple, blew, yellow, or green: e. g. *Crystall*, the *Pseudo-Adamantes*, the *Cornish-Stones*, the *Bristow-Stones*, *Crystallized Sparrs*, the *Amethyist*, the *Sapphire*, the *Topaz*, the *Emerauld*, and several others.

My business here is to enquire into the *Origin* and *Production* of these *Metallick* and *Mineral Bodies*: to enquire how they came into *this Condition*, and attained *these Figures*. And as my *Observations* have been the *Light* whereby I have hitherto steered my *Course*, so I here betake my self unto *them* again; and 'tis from *them* that I prove,

1. That as the more *gross* and *massive* parts of the *Terrestrial Globe*: the *Strata* of *Stone*, *Marble*, *Earth*, and the

the rest, owe their *present Frame* and *Order* to the *Deluge* * : so likewise do * *Vid. Part 2.*
Metalls and *Minerals* ; the far great-
 er part of them, I mean all those
 which we now find lodged in those
Strata amongst the Sand, Earth, &c.
 being actually reposed therein during
 the time that the *Water* covered the
Earth : and the *Earth* it self then put
 into such a *Condition* that the rest, I
 mean those we now find in the per-
 pendicular *Intervalls* should be collect-
 ed thither by degrees, and be formed
 almost of course, meerly by the ordi-
 nary *Motion* of the *Water*, and its
Passage to and fro in the *Earth* †. † *Vid. Conf. 4. and 5. infra.*

That whilst the *Corpuscles* of *Me-*
talls and *Minerals*, together with those
 of *Stone*, *Marble*, *Cole*, *Chalk*, and the
 like courser *Matter* : as also the *Shells*,
Teeth, and other *Parts* of *Animals*, and
Vegetables : were sustained in the *Wa-*
ter, at the *Deluge* || ; after some time, || *Part 2. Consect. 2.*
 that the *Commotion* was over, and the
Water come to a calm and sedate State,
 such of those *Corpuscles*, as happened
 to occur or meet together, affix'd to
 each other ; and, many of them con-
 vening, uniting, and combining
 into one *Mass*, formed the *Metallick*

and *Mineral Balls* or *Nodules* which we now find.

That all *Metallick* and *Mineral Nodules* whatever: as well those which are in *rude Lumps*, such as the common *Pyrites*, *Flints*, *Agates*, *Onyxes*, *Pebles*, *Jaspers*, *Cornelions*, and the like: as those which are of a more *regular* and *observable Shape*, such as the *Selenites*, *Belemnites*, *Astroites*, *Stelechites*, *Mineral Coral*: and, in one word, all *others* whatsoever, were *formed* at *this Time* and by *this Means*.

That in *such Parts* of the *Water* where the *Corpuscles* so sustained changed to be all of the *same kind**: or, at least, where there were fewer kinds or varieties of them, the *Nodules*, which were thus formed out of them, were more *simple*, *pure*, and *homogeneous*; as are the *Selenites*, and some kinds of *Pebles* and *Flints*, to name no more. But where (as indeed it generally fell out) there happened to be a *greater variety* of *Corpuscles*, as suppose of *Nitre*, of *Vitriol*, of *Iron*, of *Copper*, or whatsoever else, sustained *promiscuously* together, there the *Nodules*, formed out of them, were *mixt*, and consisted of a *greater variety*

*Vid. Part.
5. Conf. 1.

ety of Matter confusedly associated into the same Lump. Of this the *Pyritæ* may serve for an Example; whereof some yield Iron, Sulphur, and Vitriol: others Copper and Alum: yea some of them contain all these, and several more, in the same Nodule.

That the Bones, Teeth, Shells, and other like Bodies, being sustained in the Water together with these Metallick and Mineral Corpuscles ||, and the said Corpuscles meeting with, and hitting upon those Bodies, they affix'd unto them, and became conjoyned with them; some of them (though this very rarely) passing into their Pores and Interstices: others adbering in Lumps, or Masses, to their Out-sides, and indeed oftentimes combining in such numbers upon the exterior Surface of the Shell, Tooth, &c. as wholly to cover and involve it in the Mass they together constituted: and others of them entering into the Cavities of the *Echini*, *Cochleæ*, *Conchæ*, and other Shells, till they had quite filled them up; those Shells, by that means, serving as Proplasmes, or Moulds, to the Matter which so filled them, limiting and determining both the Dimensions

|| Part 2.
Conf. 2.

N 3

and

and *Figure* of it. That accordingly we at this day find some few of these *fossil Shells*, and other *Animal Substances*, with *Iron-ore*, *Spar*, *Vitriol*, *Sulphur*, and the like, intruded into their *Pores*. But far greater numbers of them with *Lumps* of *Flint*, *Ores*, of *Metalls*, and *Minerals*, growing firmly to the *Out-sides* of them, and oftentimes in such *quantity* as that the *Shell* or *Tooth* is wholly covered by those *Minerals*, being immers'd or included in the *Mass* they constitute. Infomuch that 'tis very usual, upon breaking *Flints*, *Pyrites*, &c. to find *Pectines*, *Concha*, and the like, enclosed, even in the very middle of them. As common is it to find *Echini*, *Cochlea*, *Concha*, and other *Shells*, having their *Cavities* fill'd up with *Ores* of *Metalls*, *Flint*, *Spar*, *Native Vitriol*, *Arsenic*, and other *Minerals*. Not but that these *Minerals* many times survive the *Shells* which gave them their *Forms*, and are found even after those are rotted and disappeared. For though, when lodged in *Chalk*, or the like close Matter, which preserves and secures them against external Injuries, those *Shells* are constantly found upon, and actually investing

vesting the *Flint, Spar*, or other *Mineral*, and are commonly as *fair* and *entire* as any of their fellow *Shells* at *Sea*: yet when they happened to be lodged amongst *Sand, Gravel*, or the like *laxer Matter*, the *Shells* are usually *perish'd* and *gone* *, and so the *Flint, Spar, &c.* left *uncover'd*. In which *Case*, the said *Flint, Spar*, or other *Mineral*, is of a *constant, regular*, and *specifick Shape*, as is the *Shell* whence it borrows both that *Shape*, and indeed its *Name*; these being the *Bodies* which are called, by *Naturalists*, *Echinitæ, Cochlitæ, and Conchitæ* †, as *resembling* the *Shells* of those names. Which truly many of them do very nearly; they haveing taken the *Impresses* of the *Insides* of these *Shells* with that exquisite *Niceness* as to expresse even the smallest and finest *Lineaments* of them. Infomuch that no *Metall*, when melted and cast in a *Mould*, can ever possibly represent the *Concavity* of that *Mould* with greater *Exactness* than these *Flints*, and other *Minerals*, do the *Concavities* of the *Shells* wherein they were thus *moulded*.

That at length all this *Metallick* and *Mineral Matter*, both that which con-

* *Vid. Part 3. Sect. 1. Conf. 1.1.*

† *Conf. Part 5. Conf. 5.*

† Conf.
Part 2.
Conf. 3.

tinued *asunder*, and in *single Corpuscles*, and that which was *amass'd* and *concreted* into *Nodules* *subsided* down to the bottom: at the same time that did the *Shells*, *Teeth*, and other like *Bodies*: as also the *Sand*, *Cole*, *Marle*, and other *Matter* whereof the *Strata* of *Sand-stone*, *Cole*, *Marle*, and the rest are for the most part *composed* †; and so were *included in*, and *lodged* amongst, *that Matter*.

That in regard that both the *ordinary Terrestrial Matter*, and the *Mineral* and *Metallick Matter* which was assumed up into the *Fluid* was *different* in *different Parts* of it; being in *some Places* all chiefly of *one kind*, suppose *Sand*: in *others* of a *different kind*, e.g. *Chalk*: and in *others* of *several kinds* together, as *Sand*, *Chalk*, and many more: and there being no other *Place* or *Apartment* in the *Globe* assigned to any of this *Matter* than *that* whereinto its own natural *Gravity* bore it, which was only *directed downwards*, whereby it obtained *that Place* in the *Globe* which was just underneath *that Part* of the *Fluid* where it was *sustained* when the *Subsidence* began; it thence happened that the
Strata,

Strata, which were afterwards constituted by this Matter thus subsiding, are also different in different Places: in some all, or most of them, of Sand-stone: in others of Chalk: and in others of both Sand-stone and Chalk, and perhaps many more, lying each upon other. And the Case of Metals and Minerals being the same, 'tis for that reason that in some places we now get Iron, or Vitriol; but no Copper, or Alum: in others we find these, but not those: and in others both these, and those, and perhaps many more.

That the Place, both of the several sorts of Terrestrial Matter, and of Metals and Minerals, whilst sustained in the Fluid, being thus contingent, and uncertain; their Intermixtures with each other, and with the Terrestrial Matter, in the Sediment, or Strata, which subsiding they together composed, must consequently be uncertain likewise; that Metall or Mineral, of whatever kind it chanced to be, which was sustained in any Part of the Fluid, settling only directly downwards, was lodged amongst the Terrestrial Matter which chanced to be sustained together with it in the same Part, of what kind soever

† *Vid.*Pag. 173.
supra.

soever that *Matter* was. And accordingly we now find them *uncertainly* mixt: the same *Metall* or *Mineral* lodged, in *some places*, in *Stone*: in *others*, in *Cole*, and in *others*, in *Clay*, *Marle*, or any other *Matter* indifferently †.

* *Vid.*Pag. 173.
supra.

And as we find the same *Metall* or *Mineral* lodged amongst *different Sorts* of the common *Terrestrial Matter*, so do we, for still the same reason, also find *different Kinds* of *Metalls* and *Minerals*, *Copper*, *Iron*, and *Sulphur*, *Tin*, *Lead*, and *Vitriol*, with *several more*, lodged all confusedly together in the very same sort of *Terrestrial Matter* *.

That the *Quantity* of the *Metallick* or *Mineral Matter* taken up into the *Fluid* was *various* and *uncertain*: there being in *some Parts* little or perhaps none of it: in *others* a very great abundance. And so we at this day find it; in *some Places*, little, or none: in *others*, in such plenty as to exceed even the *ordinary Terrestrial Matter*, and of it self to compose whole *Strata*, without any considerable *Admixture* of *Sand*, *Clay*, or other *common Matter*. Thus we sometimes see whole *Strata* compiled of *Metallick* and *Mineral Pyritæ*: others of *Pebles*, and of *Flints*,

Flints, without the Interposition of any other Matter: that *finer Matter* commonly found amongst these, and vulgarly called *Sand*, being really no other than very *small Pebles*, as may appear to any one who shall carefully examine and observe it, especially with a good *Microscope*. Thus likewise we find *Strata* consisting almost entirely of *Common Salt*: others of *Ochre*: and others of several *Metalls* and *Minerals*, *Tin*, *Lead*, *Vitriol*, *Nitre*, and *Sulphur*, promiscuously, without any considerable *Intermixture* of coarser *Terrestrial Matter*.

That the *metallick* and *mineral* Matter, which is now found in the *perpendicular Intervalls* of the *Strata*, was all of it *originally*, and at the Time of the *Deluge*, lodged in the *Bodies* of those *Strata*: being interspersed or scattered in *single Corpuscles*, amongst the *Sand*, or other Matter, whereof the said *Strata* mainly consist. That it was *educed* thence, and *transmitted* into these *Intervalls*, since that time; the *Intervalls* themselves not *existing* till the *Strata* were formed, and the *metallick* and *mineral Matter* actually lodged in them; they

* Conf.
Part 2.
Conf. 3. & 6.
Part 3.
Sect. 2.
Conf. 3.
& Part 4.
Conf. 3.

5.

† Part 3.
Sect. 1.
Conf. 8.

|| Ibid.

they being only *Breaches* of the *Strata*, and not made till the very conclusion of the *Catastrophe*, the *Water* thereupon immediately withdrawing again from off the *Earth* *.

That the *Water* which *ascends* up out of the *Abys*s, on all sides of the *Globe*, towards the *Surface* of the *Earth* †, incessantly *pervading* the *Pores* of the *Strata*, I mean the *Interstices* of the *Sand* or other *Matter* whereof they consist, *detaches* and *bears* along with it all such *metallick*, *mineral*, and other *Corpuscles* which lye loose in its way, and are withal so *small* as to be able to *pass* those *Interstices*: forcing them along with it into the *perpendicular Intervalls*; to which it naturally directs its *Course*, as finding there a ready *Exit* and *Discharge* ||, being partly *exhaled* thence up into the *Atmosphere*, and partly *flowing forth* upon the *Surface* of the *Earth*, and forming *Springs* and *Rivers*.

That the *Water* which falls upon the *Surface* of the *Earth* in *Rain*, bears also some, though a lesser, share in this *Action*; this, soaking into the *Strata* which lye near the *Surface*, straining through

through the Pores of them, and advancing on towards their perpendicular Intervalls *, bears thither along with it all such moveable Matter as occurs in those Pores, in much the same manner as does the Water which arises out of the Abyss; with this only difference, that this passes and pervades none but the superficial and uppermost Strata, whereas the other permeates also those which lye lower and deeper.

That the metallick and mineral Corpuscles, being thus conveyed into these Intervalls; and the Water there having more Room and freer Passage than before, whilst it only penetrated the Pores of the Stone, it deserts the said Corpuscles, leaving them in these Intervalls; unless it flow forth with a very rapid and precipitate Motion; for then it hurries them out along with it, till its Motion becomes more languid and remiss, when it quits and abandons them †.

That by the Water, thus passing through the Stone to its perpendicular Intervalls, was brought thither all the metallick and mineral Matter which is now lodged therein: as well that which lyes only in an indigested and confused Pile †,

* Part 3.
Sect. 1.
Conf. 4.

† Conf.
Conf. 12. &
13. infra.
6.

† *Vid. Pag. 177. supra.* *Pile †*, in which manner the far *greatest Part* of it is found, and particularly the *common Ores of Metalls*, *Iron*, *Tin*, *Lead*, and the rest, as also *Spar*, *Alum*, *Vitriol*, *Sulphur*, and other *Minerals*: as that which is disposed and formed into some *observable Figure*, such as the *metallick and mineral Stalactites*, the *angulated or Crystallized Metalls and Minerals* *, and *to be short*, all others whatever.

* *Vid. Pag. 177. supra.*

7.

That there is not, whatever some Men may have fancied, any thing very *strange and extraordinary* in the *Production* of the said *formed Metalls and Minerals*, which are found in these *Intervalls*: nor other *plastick Vertue* concerned in shaping them into those *Figures* than meerly the *Configurations* of the *Particles* whereof they consist, and the simple *Motion* of the *Water* to bring those *Particles* together. That particularly the common *Stalactites*, *Lapis Stillatitius*, or *Drop-stone*, which consists principally of *Spar*, and is frequently found, in form of an *Iceycle*, hanging down from the tops and sides of *Grotto's*, and of the lesser *perpendicular Intervalls*, was formed by the *Water* which continually

ally is passing through the *Strata* into these their *Intervalls*. For *this* takes the *Sparry Particles* as they lay disperfedly mingled with the *Sand*, or other *Matter* whereof those *Strata* confift, and bears them on with it to the faid *Intervalls*; where iffuing leifurely out of the *Strata*, and having now free paffage, it *deserts* these *Particles*, falling down from the *Tops* and *Sides* of the *Grotto's*, to which the *Particles* affixing by little and little, *incruff* them over with a *Sparry Cover*, and alfo form these *Stalactitæ*, from which the *Water* is continually falling and diftilling drop by drop; which gave occafion to that *Miftake* of thofe who fuppofe these *Bodies* to be only *Water* petrified, as they fpeak, or converted into these *Sparry* or *Stony Icecycles*, in the fame manner as it is by *Frost* congealed into the *Icey ones* which hang down from the Eaves of Houfes, from Pipes, or other conveyances of Water. That the *Iron*, and other *metallick Stalactitæ*: the *Aluminous*, and the *Vitriolick Stalactitæ*: the *Saline ones*, or thofe which confift of *common Salt*, and *all others*, are found *fufpended* in the *fame manner*, and their *Matter* was
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conducted out of the *Strata* to their Fissures by the *same Means*.

8. That the *Iron-Rhombs*, *Tin-Grains*, and other *Ores of Metals*, which are found in these *Intervalls* naturally formed into *Cubick*, *Pyramidal*, or other *Figures*: as likewise the *Minerals* which are there *shot* into the like *Figures*, such as the *Mundick-Grains*, *crystallized native Salt*, *Alum*, *Vitriol*, and *Sulphur*: the *Gemms* also which are thus figured, e.g. *Crystal*, the *Pseud-Adamantes*, the *Amethyst*, *Emerald*, and the rest: I say *these* and all other natural *metallick* and *mineral Crystallizations*, were effected by the *Water*, which first brought the *Particles* whereof each consists out from amongst the *Matter* of the *Strata*, into these their *Intervalls*, in much the same manner that the *common*, or *artificial Crystallizations* of *Alum*, *Vitriol*, and the like, are now effected in the *Water* wherein they were before dissolved: and as are the *Chymical Crystallizations* of other *Minerals* and *Metals* in their several *Menstrua*; whereof more in its Place.

9. That the *Corpuscles* of *Metals* and of *Minerals* being *smaller* than those of
Sand

Sand and of the other common *Terrestrial Matter*, and consequently the *Pores* of the *Strata*, which consist mainly, or at least contain in them a considerable quantity of *these* *, being *lesser* and *narrower* than *those* of the *Strata* of *Sand-stone*, and the like common and *crasser Matter*, the *Water* which ascends from beneath towards the Surface of the Earth is admitted into them, if at all, only in *lesser quantity*, passes them *slowly* and *difficultly*, and therefore hath not *Scope* and *Power* sufficient to *dislodge* the *Corpuscles*, and *bear* them off with it into the *perpendicular Intervalls*, as it does in those *Strata* which consist chiefly of *Stone*, and the like *grosser Matter*, where the *metallick* and *mineral Corpuscles* lye thinner, and so the *Pores* are more *wide* and *open*. That, for this reason, in the *Intervalls* of those *Strata* which abound plentifully with *Iron*, *Tin*, *Spar*, *common Salt*, *Alum*, or the like, we ordinarily find a *lesser quantity* of these *Metalls* and *Minerals* resident, than we do in the *Intervalls* of some other *Strata* which now shew little, or perhaps nothing in the *Bodies* of them besides *Sand* and such like

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coarser

* Confer.
Consect. 3.
Pag. 187.
supra.

coarser Matter. For there is so admirable a *Contrivance* in this *Affair*, that the *Water* does not *disturb* and *remove* that *metallick* or *mineral Matter* which lyes in the *Strata* in great *Plenty*, and so is there *ready collected* to the hand of *Man*: but only *that* which needs such an *Agent* to *collect* it: *that* which is so *sparingly* and *dispersedly* intermix'd with the *common Terrestrial Matter*, as not to be *discoverable* by *humane Industry*; or, if *discoverable*, so *diffused* and *scattered* amongst the *crasser* and more *unprofitable Matter*, that 'twould never be possible to *separate* and *extract* it. Indeed if 'twas, it would not *defray* the *Charge* and *Labour* of the *Extraction*; and therefore it must needs have been all *irretrievably lost*, and *useless* to *Mankind*, was it not here, by this *Action* of the *Water collected* and brought into one *Mass*.

10.

That therefore the *Metalls* and *Minerals* which are lodged in the *perpendicular Intervalls* of the *Strata* do *still grow*, (to speak in the *Mineralists* phrase) or receive additional *Encrease* from the *Corpuscles* which are yet *daily born* along with the *Water* into *them*. Nay they have *grown* in like manner
ever

ever since the Time of the *Deluge*, in all such *Places* where those *Intervalls* are not already so filled, that they cannot receive any more: or where the *Stock* of *metallick* and *mineral* *Corpuscles*, originally lodged in the *Strata*, is not quite exhausted, and all borne thither already. That yet this *Encrease* is not now any where very great; the *Corpuscles*, which were capable of being stirred and removed, being, by the continual *Passage* of the *Water* for so many *Ages*, in most places exhausted, educed forth of the *Strata*, and transmitted into these their *Fissures*.

That the *metallick* and *mineral* *Matter* which lyes in the *Bodies* of the *Strata* does not now grow: nor hath it ever received any *Addition* since 'twas first reposed in those *Strata* at the Time of the *Universal Deluge*; but, on the contrary, hath been diminished and lessened by so much as hath been conveyed into their perpendicular *Intervalls*, and as hath been brought forth upon the *Surface* of the *Earth* by *Springs*, *Rivers* *, and *Exhalations* † * *Vid. Conf.*
 from the *Abys*s, ever since that Time. † *12. infra.*
 That notwithstanding there have, and † *Vid.*
 do still, happen, *Transitions* and *Re-* *Conf. 14.*
moves *infra.*

moves of it, in the *solid Strata*, from one part of the same *Stratum* to another part of it, occasioned by the *Motion* of the *Vapour* towards the *perpendicular Intervalls* of these *: and, in the *laxer Strata*, such as those of *Sand*, *Clay*, and the like, from the *lower ones* to those which lye *above* them, and even to the very *Surface* of the *Earth*, occasioned by the *Motion* of the *Vapour* directly towards the *Surface*, it pervading these looser *Strata* diametrically †. But of this I have not room to enlarge more particularly in this place.

* Part 3.
Conf. 8.

† Ibid.

12.

That the *Bitumen* which is found in *Lumps*, or coagulated *Masses*, in some *Springs*; and which is, in others, found floating in form of an *Oyl* upon the *Surface* of the *Water*, when 'tis called by Naturalists *Naphtha*, and *Petroleum*: the *Salt* wherewith the *Salinae*, or, *Salt-Springs*, abound: the *Vitriol*, *Atum*, *Nitre*, *Sulphur*, *Spar*, and other *Minerals*, wherewith the *Acidulae*, or *Medicinal-Springs* are saturated: I say, all these *Minerals* were originally lodged in the *Strata* of *Stone*, *Cole*, *Earth*, or the like: that they were *educed* thence, and conveyed into these *Springs*, by the
Water

Water pervading those *Strata* in its *pas-* * *Conf.*
sage from the *Abyss* towards the said *Part 3.*
Springs ||. *Sect. 1.*

That when the *Water* of *Rivers* is- *Conf. 8.*
 fues out of the Apertures of them with *and Part 4.*
 more than ordinary *Agitation* and *Ra-* *Conf. 5.*
pidity, it usually *bears forth* along with *13.*

it such *Particles* of *Spar*, *Argilla*, or
 other *loose* and *moveable Matter* as it
 met with in its *Passage* through the
Stone, *Marble*, or other *solid Strata*.
 That it *sustains* these *Particles*, and *car-*
ries them on together with it till such
 time as its *Motion* begins to *remitt* and
 be *less rapid* than it was at, and near
 its *Sourse*; when by degrees it *lowers*
 them, and lets them *fall*, *deposing* and
affixing them upon any thing which
 occurs in the way, as *Stones*, *Shells*,
Sticks, or other like *Bodies*; especially
 those which lye in the *Sinus's* or
Creeks of those *Rivers*, where the *Mo-*
tion of the *Water* is more *sluggish* and
languid than in the *Stream*, or middle
 of the *Chanel*. That some *Rivers*
 do thus bring forth *Spar*, and other
mineral Matter in great *Quantity*, so
 as to *cover* and *incrust* the *Stones*,
Sticks, and other *Bodies* lying therein,
 to a very considerable *Thickness*. That

sometimes the *Water* of *Standing-Springs* does the same: *precipitating* the *mineral Matter* which it brought forth of the *Strata*, upon the *Stones* at the bottoms and sides of the said *Springs*: and *affixing* it upon *Sticks*, *Straws* and other *Bodies*, and upon the *Moss*, or other *Plants* which happen to grow therein; *incrusting* them over, in like manner as does the above-mentioned *Water* of *Rivers*.

14.

* Part 1.
Pag. 46.
and Part 3.
Sect. 1.
Conf. 8.

That when the *Heat* at, and upon, the *Surface* of the *Earth* is great, it not only *mounts up* the *Water* sent from beneath, and, along with it, the lighter *Terrestrial Vegetative Matter* *, but likewise the very *mineral Matter* it self, *Sulphur*, *Nitre*, *Vitriol*, and the like; the *Atoms*, or *single Corpuscles* whereof being *detach'd* from their respective *Beds* in the *Earth*, it *bears* quite to the *Surface* of it, and the *light* and more *active* sorts of them up into the *Atmosphere*, together with the *Vapour*, which, when condensed, falls down again in *Rain*. That this *Matter* is thus carried up in greater or lesser *Plenty*, and to a greater or lesser *Height*, answerably to the greater or lesser *Quantity* or *Intenseness* of the *Heat*.

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That

That wherever there happen to be any extraordinary Discharges of the Subterranean Heat : either *Vulcano's*, or lesser *Spiracles*, such as those about *Naples*, *Pozzuolo*, and in other Parts of the World : *Thermæ*, or *Hot Springs* : or fiery *Eruæations*, such as burst forth of the Earth during *Earthquakes* ; I say wherever there are such or the like Discharges of this Subterranean Fire, there likewise is mineral Matter, more or less, hurried up along with it. That even the Heat of the Sun, and indeed any other, though but an accidental Heat, hath the same Effect, and contributes to the raising of mineral Matter out of the Earth.

That *Ætna*, *Vesuvius*, and the other *Vulcanoes* discharge forth, together with the Fire, not only metallick and mineral Matter in great Quantity, but Sand likewise, and huge Stones : and with that Force too as to toss them up sometimes to a very great Height in the Air.

That the Heat, which arises out of the lesser *Spiracles*, also brings forth along with it mineral Matter, and particularly *Nitre*, and *Sulphur* ; some of which it affixes to the tops and sides

of the *Grotto's* as it passes, which *Grotto's* are usually so hot as to serve for *natural Stoves*, or *Sweating Vaults*: some it *deposes* near unto, and even upon, the *Surface* of the *Earth*; inso-much that in some places the *Flores Sulphuris* are gathered in considerable *Plenty* near these *Spiracles*: some it bears in *Steams* up into the *Air*, and this in such *quantity* too as to be manifest to the *Smell*, especially the *Sulphur*, that *Mineral* so particularly affecting this *Sense*.

* vid.
Conf. 12.
supra.

That the *Heat* which is continually passing up towards the *Therma*, brings thither along with it *Particles* of *Spar*, *Alum*, *Sulphur*, *Nitre*, and other *Minerals*, in such *quantity*, that these ordinarily as much exceed the common *Acidulae* * in *plenty* of this *mineral Matter* as they do in *Heat*. That this *Heat*, ascending out of the *Therma*, bears up with it not only *Water*, in form of *Vapour*, but likewise *mineral Matter*; some whereof it *affixes* to the *Sides* and *Arches* of the *Grotto's* where these *Therma* arise in *such*: or, if they be covered with *Buildings*, to the *Walls* and *Roofs* of those *Buildings*: to the *Pipes* through which the *Water* is conveyed,

veyed, or the like. That Sulphur is in some places collected very plentifully adhering to the Stone of these Grotts, and Buildings: yea sometimes Spar, and other crasser Minerals, are thus mounted up, till, being stop'd by the Walls and Roofs, Part affix to them, incrusting them over, and the rest are reverberated and form Stalactitæ, or Sparry Iceycles hanging down from the Arches of the Grotto's, from the Capitals of the Pillars, and Roofs of the Buildings. That where these Thermæ are not thus covered and vaulted over, so that the mineral Matter is not stop'd and hinder'd in its Ascent, a great part of it advances directly up into the Atmosphere.

That the Heat which is discharged out of the Earth at the time of Earthquakes || brings forth Nitre, Sulphur, || Part 3. and other mineral Matter along with Sect. 1. it. That the Water also which is at Conf. 12. the same time spued out *, through pag. 138. & 140. the Cracks or Chasmes opened by the supra. Earthquake, and through the Aper- * Ib. pag. 134. tures of Springs and Rivers, is turbid and stinking, as being highly saturated with mineral Matter. That the Acidula, or Medical Springs emitt then likewise

wise a greater *quantity* of their *Minerals* than *usual*: and even the *ordinary Springs*, which were before *clear, fresh, and limpid*, become *thick and turbid*, and are impregnated with *Sulphur* and other *Minerals*, as long as the *Earthquake* lasts. That these *Minerals* do not issue out only at these larger *Exits*, but steam forth likewise through the *Pores* of the *Earth*, occasioning those *Sulphureous, Arsenical*, and other *offensive Stenches* which usually attend *Earthquakes*, and are the *Cause* of the *Fevers* and other *malignant Distempers* which commonly *succeed* them: bringing on oftentimes great *Mortalities*, not only amongst *Men*, but even the very *Beasts* and *Fishes*. That these *mineral Eruptions* arise in such *quantity* up into the *Atmosphere* as to *thicken, discolour, and darken* it sometimes to a very great degree.

That *any Heat* whatsoever, even an *accidental* one, such as is that which proceeds from the *Bodies of Animals*, and from their *Excrements*, promotes the *Ascent* of *mineral Matter*, but more especially of that which is *subtile, light, and active*, and is consequently *moveable* more *easily*, and with a *lesser Power*.

Power. That by this means *Nitre* (wherever there happens to be any in the *Earth* underneath) is raised in *Stables*, *Pigeon-Houses*, and other like *Receptacles* of *Animals*: and in those places where their *Dung* lyes heap'd up. That 'twas *this* which occasioned, in some, an *Opinion* that *Nitre* proceeds forth of those *Animals*, and their *Excrements*; whereas it is found raised up, and convened or collected indifferently and as well in *Buildings* where *Animals* rarely or *never* come, as in those they ordinarily frequent; not to mention *that* which is found sometimes in considerable *plenty* at great *depths* in the *Earth*: in the *Water* of *Springs*, of *Rivers*, of *Lakes*, and, in some *Parts*, even of the *Sea* it self; whereof more largely hereafter. That, in such places where the *Earth* contains *Nitre* within it, though there be no such *adventitious Heat*, if that *Heat* which is almost continually *steaming* out of the *Earth* be but *preserved*, its *Dissipation* prevented, and the *Cold* kept off by some *Building* or other like *Coverture*, *this* alone is ordinarily sufficient to *raise* up the *Nitre*, and *bear* it out at the *Surface* of the *Earth*,

Earth, (unless its *Egress* be impeded by *Pavements*, or the like *Obstructions*) and *mount* it up into the *Air*, as far as those *Buildings* will permit. For, the *Cielings* and *Walls* stopping it in its *Ascent*, it usually *affixes* unto them, and settles there. And accordingly 'tis frequently found thus *affix'd* to the *Walls* and *Cielings* of *Ground-Rooms*, *Cellars*, and *Vaults*; and this sometimes in such *quantities* as to form *nitrose Stalactitæ* †, hanging down from them in form of *Iceycles*, especially from the *Tops* and *Arches* of *Cellars* and *Vaults*.

† Confer.
Pag. 201.
supra.

That the *Heat* of the *Sun* in the *hotter Seasons* being very *intense*, and penetrating the *exteriour* or *superficial* parts of the *Earth*, it thereby *excites* and *stirs up* those *mineral Exhalations*, in *subterraneous Caverns*, in *Mines*, and in *Cole-pits*, which are commonly called *Damps*. That it is for this reason that *these* seldom or never happen but in the *Summer time*; when, the *hotter* the *Weather* is, the *greater* and *more frequent* are the *Damps*. That besides *this* of the *Sun*, they are also sometimes *raised* by the *Accession* of *other Heat*, and particularly by the *Fires* which

which the *Miners* use in the *Grooves*, for breaking the *Rocks*, and for other Ends. That the *Quantity* of *mineral Matter* thus raised is according as there is *more* or *less* of it in those *Mines*, especially of *Sulphur*, *Nitre*, and the like subtile and easily moveable Minerals: and as the *Heat* is there more or less intense. That this *mineral Matter* being sustained in the *Air* there, and floating about in the *Mines*, and *Pits*, it hits upon, and affixes it self unto, the *Workmens Tools*, to their *Cloaths*, *Candles*, or any other *Bodies* that occur. That where there is any considerable quantity of *Sulphur* in the *Exhalation* thus floating too and again, it takes *Fire* at the *Candles*, burns with a *blue Flame*, and emits a strong *sulphureous Smell*. That these *Damps* differ in their *Effects* according to the different *Minerals* that are the Cause of them; ours in *England* being generally reducible to two kinds; whereof one is called the *Suffocating*, the other the *Fulminating Damp*. That the former of these extinguisheth the *Candles*, makes the *Workmen* faint, and vertiginous, and, when very great, suffocates, and kills them. The *Fulminating*

minating Damp will take *Fire* at a *Candle*, or other *Flame*; and, upon its *Accension*, gives a *Crack* or *Report* like the *Discharge* of a *Gun*, and makes likewise an *Explosion* so forcible as sometimes to kill the *Miners*, break their *Limbs*, shake the *Earth*, and force *Coles*, *Stones*, and other *Boaies*, even though they be of very great *Weight* and *Bulk*, from the bottom of the *Pit* or *Mine*, up through the *Shaft*, discharging them out at the *Top* or *Mouth* of it, sometimes striking off the *Turn* which stands thereon, and mounting all up to a great height in the *Air*; this being succeeded by a *Smoak* which both in *Smell*, and all other respects, resembles fired *Gun-powder*; and is, as may appear from these and other *Phænomena* of it, nothing but an *Exhalation* of *Nitre* and *Sulphur*, which are the principal *Ingredients* of that *Composition* we call *Gunpowder*. That as these *Damps* are caused by *Heat*, so they are remedied by withdrawing that *Heat*, and by conveying forth the *mineral Steams*; which the *Miners* effect by *Perflations* with large *Bellows*: by letting down *Tubes*, and sinking new *Shafts*; whereby they give free
Passage

Passage and Motion to the Air, which ventilates and cools the Mines, purges and frees them from these mineral Exhalations.

That at such time as the *Sun's power* is so great as thus to penetrate the *exteriour Parts* of the *Earth*: to disturb these *mineral Particles*: and raise them from out the *Strata* wherein they lay, it does not only *sustain* them in the *Air* of *Grotto's*, *Mines*, and other *Caverns* under ground, but likewise *bears* them out through the *Mouths* of those *Caverns*, and through the ordinary *Cracks* and *Pores* of the *Earth*, mounting them up, along with the *watery Exhalations*, into the *Atmosphere* †, especially † *Vid. Part 3. Sect. 1. Conf. 8.* *Sulphur*, *Nitre*, and the other more *light and active Minerals*; where they form *Meteors*: and are particularly the *Cause of Thunder*, and of *Lightning*. That, this *mineral Matter* requiring a considerable degree of *Heat* to raise it, the most *Northern Climes*, and the *Winter Seasons*, are, for that reason, little or not at all troubled with *Thunder*; it seldom happening, in any great measure, but in the *hotter Months*, and in the *Southern Countries*, as in *Congo*, *Guinea*, and other *Parts of Africa*,
and

and in the *Southern Parts* of *Asia* and *America*; where 'tis, during the *Season* of their great *Rains* ||, horribly loud and astonishing, and as much exceeds the *Thunder* of these *Northern Climes*, as the *Heat* there exceeds that of these *Climes*. That the *mineral Matter* which is discharged forth of *Vulcano's*, and other like *Spiracles*: and out of the *Therma*, ascends up into the *Air*, and contributes to the *Formation* of these *Meteors*. That likewise the *Nitre* and *Sulphur*, which are belch'd forth of the *Earth* at the time of *Earthquakes* (the *Countries* which are most obnoxious to this *Malady* abounding, as I have already intimated †, with these two *Minerals* particularly) in such plenty as to thicken and darken the *Air*, constitute there a kind of *Aerial Gunpowder*, and are the *Cause* of that dismal and terrible *Thunder* and *Lightning* which commonly, if not always, attend *Earthquakes*; even when all was till then calm and clear, and not the least *Sign* or *Presage* of any such thing before the *Earthquake* began.

* Vid. pag.

202. supra.

|| Vid. pag.

205, 206.

supra.

That as the *mineral Eruptions* which happen during *Earthquakes* *: and the *Streams* and *Damps* of *Mines* || are detrimental

mental to *Health*, hurtful and injurious to the Bodies of *Men* and other *Animals*, so likewise are the *Mineral Exhalations* which are thus raised by the *Sun* out of the Body of the *Earth* up into the *Atmosphere*: but more especially in those *Parts* of it where there are *Arsenical*, or other like *noxious Minerals* lodged underneath. That these mingling with, and being disseminated in the *Air*, and passing together with it into the *Lungs* in *Respiration*, are by them transmitted into the *Body*, where they infect the Mass of *Blood*, create *Perturbations* and disorderly *Motions* therein, and lay the Foundation of *Pestilential Fevers*, and other malignant *Distempers*. That 'tis for this reason that the *Southern Countries* are more frequently molested and incommoded by these *Distempers* than the *Northern* are: and that they are more rife and stirring in the *hotter Months*, in *July* and *August*, than in the *colder*, *December*, *January*, and the rest. That 'tis indeed true, that in *September* and *October*, which are none of the *hottest Months*, these *Diseases* are oftentimes as *epidemical* as in the precedent and *warmer Season*: and

do not *abate* and *remit* in proportion to the *remission* of the *Sun's Heat* in those Months; but this is purely *accidental*, and happens meerly because the *Heat within the Earth* is not liable to so sudden *Vicissitudes*, or so quickly spent and dispersed, as is that which is upon it, and in the *Air*. This therefore, the Pores of the *Earth* remaining still as free, and open, as ever, continues to send out the *mineral Steams* as before, but in lesser and lesser quantity, answerably to the gradual *Diminution* of this *Heat*. Which *Steams* though now sent up to the *Surface* of the *Earth* only in lesser plenty, may be much more offensive and mischievous than in the hotter Months when it came forth in far greater. For the *Sun's* power being in those Months also greater, it then straitways hurries these *Steams* up into the *Atmosphere*: whereas in the colder, its power being lessened, it cannot bear it up so fast; so that it stays and stagnates near the *Surface* of the *Earth*, swimming and floating about in that Region of the *Air* wherein we breath; where it must needs be much more pernicious than when born up to a greater height, and so farther out of the way.

way. And this is indeed much the *Case of Fogs*: particularly of those which we frequently observe after *Sun-setting*, even in our *hottest Months*. These being nothing but a *Vapour*; consisting of *Water*, and of such *mineral Matter* as this met with in its passage; and could well *bring up* along with it. Which *Vapour* was sent up in *greater quantity* all the *foregoing Day*, than now in the *Evening*. But the *Sun*; *then* being above the *Horizon*, taking it at the *Surface* of the *Earth*, and rapidly *mounting* it up into the *Atmosphere*, it was not *discernible*, as *now* it is; because, the *Sun* being now *gone off*, and ceasing any longer to *operate* upon it, the *Vapour* *stagnates* at and *near* the *Earth*, and saturates the *Air* till 'tis so *thick* as to be easily *visible* therein. And when at length the *Heat* there is somewhat *further spent*, which is usually about the *middle* of the *Night*, it *falls down* again in a *Dew*, alighting upon *Herbs* and other *Vegetables*, which it *cherishes*, *cools*, and *refreshes*, after the *scorching Heat* of the *foregoing Day*. But if it happens, as sometimes it does; that *this Vapour* bears up along with it any *noxious mineral Steams*; it then

won P 2 blasts

blasts Vegetables, especially those which are more *young* and *tender*: *blights Corn*, and *Fruits*: and is sometimes *injurious* even to *Men* who chance to be then *abroad* in the *Fields*. 'Tis also the *Case* of *Water* at the *Surface* of the *Earth* *; where the *Springs* and *Rivers* are very *low*, yea some of them *cease* to yield any *Water* at all, in the *Summer Months*, because the *Sun's Power* is then so great as easily and speedily to *bear up* into the *Atmosphere*, in small and invisible parcels, and in form of an extremely fine and thin *Vapour*, a very great part of the *Water* which is *sent up* out of the *Abyss*. Whereas in the *Winter-time* the *Sun* is withdrawn *farther off*, and its power *lessened*, so that it cannot then buoy it up as before; for which reason 'tis that so much more of it then stands at the *Surface* of the *Earth*, and *stagnates* there. So likewise for *Rain*; we learn from *Experiment* that there commonly falls in *England*, in *France*, and some other *Countries*, more *Rain* in *June* and *July*, than in *December* and *January*. But it makes a much greater *Shew* upon the *Earth* in *these Months* than in *those*, because it lyes longer upon it; the *Sun*

* Conf.
Part 3.
Sect. 1.
Conf. 8.

now

now wanting power to *exhale* and bear it up so *quickly* and *plentifully* as then it did.

'Tis likewise the Case of the *Halitus* emitted forth of the *Lungs* of *Men* and other *Animals*. In a *Physiological Treatise*, which I have by me, concerning the *Structure and Use of the Parts of Animals*, discoursing of the *Lungs*, I shew that they are the *grand Emunctory* of the *Body*: that the *main End of Respiration* is continually to *discharge* and *expell* an *excrementitious Fluid* out of the *Mass of Blood*: and I prove from several *Experiments* that there passes out of the *Body* a *greater quantity of Fluid Matter* this way, I mean upwards, and through the *Lungs*, than there does of *Urine*, by the *Kidneys*, downwards. Now the *Fluid*, which is thus *secreted*, and *expired* forth along with the *Air*, goes off with it in insensible parcels, in the *Summer Season*, when the *ambient Air* contains *Heat* enough to *bear* it quickly away, and so *disperse* it. But in the *Winter*, when the *Heat* without is *less*, it oftentimes becomes so far *condensed* as to be *visible*, flowing out of the *Mouth* in form of a *Fume*, or *crasser Vapour*: and may, by proper *Vessels*, set in a

P 3

strong

strong freezing Mixture, the better to condense this Vapour, be collected in considerable Quantity. But to return.

That'tis not without a very extraordinary Providence that there so constantly happens, in the Month of September (the Time when chiefly these mineral Steams stagnate thus at and near the Surface of the Earth) a very nipping and severe Season of Cold, far beyond what might, from the Sun's Height and Power, be then expected: beyond that of October and November: and sometimes equal to that of January and the coldest Months: as also that there then so constantly happens very blustering and turbulent Winds; the Cold serving to check and put a stop to the Ascent of this mineral Matter: and the Wind to dissipate and convey away that which was before raised out of the Earth; which, was it not thus carried off, would be infinitely more fatal and pernicious to Man and other Animals than now it is. But I

must be contented here to give only short Hints of these, as of other Things: and to write but obscurely and reservedly, untill I have opportunity to express my Sentiments of them with greater

greater Copiousness, Freedom, and Perspicuity.

Thus much of the *Scheme* of my *Design* in this Part have I run over: and led my Reader a long and tedious Jaunt in tracing out these *metallick* and *mineral Bodies*: in pursuing them through their several *Mazes* and *Retreats*: through the *Earth*, the *Water*, and the *Air*. And yet, long as it is, we are not got much farther than the *Borders* of the *Mineral Kingdom*, and have done little more yet than settled and adjusted *Preliminaries*; so very ample is this *Kingdom*, so various and manifold its *Productions*. For the foregoing *Conclusions* relate only to the *Origin* and *Growth* of these *Bodies*; the *Natural History* of each particular *Metal* and *Mineral*, with the *Observations* whereon that *History* is grounded, being still to come. But I must be forced wholly to wave and supersede the Detail of these; for I perceive, do what I can, this *Abstract* will swell much beyond the bounds which I at first designed.

This Fourth Part will be followed by several *Treatises*, serving to confirm, and to illustrate some *Passages* in it:

whereof I shall at present only mention the *four* following.

1. *Rules and Directions* for the *Discovery* of *Metalls* and *Minerals* latent in the *Earth*: with an *Enquiry* why these lye some times so near the *Surface*, and did not, (because of their *greater Gravity*) at the *General Subsidence* in the *Deluge* †, fall to a much *greater Depth* than we now find them: even to such a *Depth* as to have lain quite out of *humane reach*, and so have been all *buried*, and irrecoverably *lost*.

† Part 2.
Conf. 3.
& Part 4.
Conf. 3.

2. An Examination of the *Common Doctrine* about the *Generation* of *Metalls* and *Minerals*: and particularly *that* of the *Chymists*; with an *Appendix*, relating to the *Transmutation* of *Metalls*; detecting the *Impostures* and *Elusions* of those who have pretended to it: and evincing the *Impossibility* of it from the most plain, simple, and *Physical Reasons*: proving likewise that there are no such natural *Gradations*, and *Conversions* of one *Metall* and *Mineral* into another, in the *Earth*, as many have fancied. As also an *Account* of the *Mineral Juices* in the *Earth*, which some *Writers* have imagined to be I know not what *Seeds* of *Miner-*

Minerals, shewing that they are, for the far greatest part, nothing but *Water* strongly impregnated with *Mineral Matter*, which it derives from the *Strata* as it passes through them ||. ^{|| Conf. 5 &c. supra.}

3. Relations, obtained from several Hands, concerning the *State of Metals* and *Minerals* in *Foreign Countries*: in divers Parts of *Asia*, *Africa*, and *America*, as well as in *Hungary*, *Germany*, *Sweden*, and other Parts of *Europe*: and particularly of those which are not found in *England*; shewing that the *Condition* of these *Bodies* in those remoter *Regions* is exactly conformable to that of *ours* here: and that they were all put into this *Condition* by the very same means †.

4. *Observations* concerning English *Amber*: and *Relations* from abroad, about the *Amber* of *Prussia*, and other distant Places. With a *Discourse* founded upon them, proving that *Amber* is not a *gumous* or *resinous Substance* drawn out of *Trees* by the *Sun's Heat*, and coagulated and hardened by falling down into *Rivers*, or the *Sea*, as the *Ancients* generally believed: but is a *Natural Fossil*, as *Pebbles*, *Flints*, *Pyrite*, and the like, are: formed at the same

† Conf.
Conf. 1.
supra.

same time, and by the *same means* that they were : and all of it originally reposed in the *Strata* of Earth, Sand, &c. together with them. That it is indeed found in some places lying upon the *Shores* of the *Sea*, and of *Rivers* : but 'tis also found at *Land*, and dug up (sometimes at very great *Depths*) in the *Earth* ; and this as well in Places very *remote* from any *Sea*, or *River*, as in those which are nearer unto them. That 'tis *digged* out of even the *highest Mountains*, and indeed all other *Parts* of the *Earth* contingently and indifferently, as the *Pyrita*, *Agates*, *Jaspers*, *Pebles*, and the rest, are. That wherever 'tis found upon the *Sea-Shores*, there also is it as certainly found at *Land*, up in the neighbouring *Country* : and particularly in *Prussia*, upon whose *Shores* so great a *quantity* of *Amber* is yearly collected, 'tis dug up almost all over the *Country*. That even that which now lyes loose upon the *Sea-Shores*, was all of it *originally* lodged in the *Earth* : in the *Strata* of Sand, *Marle*, *Clay*, and the like, whereof the neighbouring *Land*, and the *Cliffs* adjacent to those *Shores*, do consist ; and wherever 'tis
so.

so found scattered upon the *Shores*, there is it as constantly found lodged in the *Cliffs* thereabouts. That when the *Sea*, at High-water, comes up unto, and bears hard upon the said *Cliffs*, and is agitated by *Winds* and *Storms*, it frequently *beats down* huge pieces of *Earth* from them. Which *Earth*, falling into the *Water*, is, by its continued *Agitation* and *Motion* dissolved: and borne by degrees down into the *Sea*, being loose, and light, and so easily reduced into lesser *Parcels*, dissolved, and wash'd away. But the *Pebbles*, *Pyritæ*, *Amber*, or other like *Nodules*, which happened to be reposed in those *Cliffs*, amongst the *Earth* so beaten down, being *hard*, and not so dissoluble, and likewise more *bulky* and *ponderous*, are left behind upon the *Shores*; being impeded, and secured, by that their *Bulk* and *Weight*, from being borne along with the *Terrestrial Matter* into the *Sea*. That therefore the *Sea* is no ways concerned in the *Formation* of these *Bodies*: no more in the *Formation* of *Amber*, than of the *Pyritæ*, *Flints*, and other *mineral Masses* that are found together with it: but only *dislodges* and *discovers* them, bears away

away the *Earth* wherein they were *buried*, washes off the *Soil* and *Sordes* wherein they were *involved* and *concealed*, and thereby renders them more *conspicuous*, *apparent*, and easie to be *found*. That this is so known and experienced amongst the *People* who are employed to *gather* the *Amber*, that they always run down to the *Sea* side, for that purpose, after a *Storm*: and, if it hath been so *great* as to beat down part of the *Cliffs* there, they assuredly find *Amber*, more or less, upon the *Seas Ebb* and *Retirement*, and after every *Retreat* of the *Sea* for some *Tides* after; the *Sea* not bearing down the *Earth* immediately and all at once, but washing it off by little and little, and so *discovering* the *Amber* by degrees, some after one *Tide*, and some after another. That particularly the *Amber*, *Vitriolick Pyritæ*, and other like *Bodies*, that are found upon the *Shores* of *Kent*, *Essex*, *Hampshire*, and elsewhere, all came first from the *bordering Cliffs*, and were dislodged by *this means*: and are found in the *Earth*, as well as upon the *Shores*, whenever 'tis laid open, as in sinking *Wells*, *Pits*, and the like. That not only the *Sea*,
but

but *Rivers* and *Rains* also, are instrumental to the *Detection* of *Amber*, and other *Fossils*, by washing away the *Earth* and *Dirt* that before covered and concealed them. Thus the *Golden Nodules*, or, as they are commonly called, *Gold-grains*, *Amethistine Pebbles*, *Amber*, and other *Stones of Worth*, are uncovered by such *Rivers* as chance to run through the *Grounds* which contain those *Bodies* in them. Thus likewise *Rains*, by their washing the *Earth* down from off the *Hills* *, clear, and disclose such *Pyritæ*, *Selenitæ*, or other *Bodies* that happen to be lodged, near the *Surface* of the *Earth*, in those *Hills*. And 'tis by this means chiefly that the *Grain-Gold*, upon all the *Gold-Coast* (as 'tis called) in *Guinea*, is displayed; the *Rains* falling there in great *Abundance*, and with incredible *Force*, thereby the more powerfully beating off the *Earth*. This the *Negroes*, *Natives* of those *Parts*, know full well: and therefore do not expect to find much of it unless after the *Season* of their *Rains* ||; when they never fail to find it, no more than the *Amber-Gatherers* fail of finding that upon the *Sea-Coasts* after a Storm.

* Part 5.
Conf. 2.

|| Vid.
Part 3.
Sect. 1.
Conf. 8.
Pag. 125.

Storm. And if those Persons who are curious in *collecting* either *Minerals*, or the *Shells*, *Teeth*, or other *Parts* of *Animal Bodies* that have been *buried* in the *Earth*, do but search the *Hills* after *Rains*, and the *Sea-Shores* after *Storms*, I dare undertake they will not lose their Labour. But to return: That *Amber* is not only lodged in the *Strata* of *Earth*, and of *Sand* together with the other *mineral Nodules*, but is sometimes found actually growing unto, and combined into the same *Mass* || with the *Pyrites*, and others of them. That it likewise sometimes contains in it pieces of *Straws*, *Flies*, *Shells*, and other *heterogeneous Bodies*, in like manner as the *Pyrites*, *Flints*, and all other analogous *Fossils* do †. That although *Amber* be most commonly of a *yellowish Colour*, and therefore not unlike some kinds of *Gums*, yet there is found of it also of several other *Colours*, as *black*, *white*, *brown*, *green*, *blue*, and *purple*, to name no more. Yea the very same *Lump* is frequently of *different Colours*. That these *Colours* are all *accidental*, even the *yellow* it self, and owing to the *Intermixture* of *foreign Matter*;

|| *vid. Conf.*
2. *supra.*

† *Ibid.*

Matter, which concreted into the same *Mass* with the proper *Matter* of this *Stone*, and with the heterogeneous *Bodies* which are included in it, at the time of its *Coalition* †. That † *ibid.* this is the Case of *Agates*, of *Corne- lians*, of *Topazes*, and many other coloured *Stones*; the Colours of several whereof, and even that of *Amber* it self, may by a very easie *Process*, be in great measure, if not wholly, extracted, and taken from them: and the *Bodies* of these *Stones* rendred almost, if not quite, as pellucid as *Crystal*, without sensibly damaging the *Texture* of them. That even the most obvious and ordinary *Minerals* are not free from this Contagion of adventitious *Matter*: Common *Salt* it self, when found naturally crystallized amongst other *Minerals* and *Metalls*, in the perpendicular *Intervalls* of the *Strata* of *Stone*, being, not only pellucid, as it naturally is when pure and simple, but white also, and like the white crystallized *Spar*: yellow, and nearly resembling the *Topaz*: blue, and not unlike the *Sapphire*; and yet these specious *Bodies*, and *Gemms* as to outward

ward shew, upon *tryal*, yield nothing but *meer* Salt, with an extremely small *Admixture* of other *Matter*, which gave them their *Tinture*. Which may serve for a further *Instance* of the *confused state* of *Minerals* in the *Earth*: and of the *Uncertainty* of their *Colours* and *Figures* †.

† Conf.
Pag. 171.
‡ Pag.
173.

PART

PART V.

Of the Alterations which the Terraqueous Globe hath undergone since the time of the Deluge.

IT now remains that we take a view of the *Postdiluvian State* of this our *Globe*: that we examine how it hath stood for this last four thousand years: that we enquire what *Accidents* have befallen it, and what *Alterations* it hath suffered since that wonderful *Change* it underwent at the *Deluge*.

There have been some who have made a mighty Outcry about *Changes* and *Alterations* in the *Terraqueous Globe*. The *Pretences* and *Pleas* of each I consider in the *first Part* of this *Essay*; shewing that they are without any just ground: and that there are no *Signs* or *Footsteps*, in all the whole *Globe*, of such *Alterations*. And indeed 'tis well for the World that
Q there

there are not ; for the *Alterations* which they have fancied are such as turn all the *wrong way* : such as are without *Use*, and have no *End* at all, or, which is worse than none, a *bad one* : and tend to the *Damage* and *Detriment* of the *Earth* and its *Productions*.

Notwithstanding, some *Alterations* there are which it hath, and doth still undergo. This is what we may pronounce with *Certainty* : and there want not *Instances* enough sufficiently to vouch and attest it. But these *Alterations* are of a quite different *Strain* : these are as *amicable* and *benificent* to the *Earth* and *Terrestrial Bodies*, as the *others*, were there really such, would be *pernicious* and *destructive* to both.

* *Part 4.*
Conf. 4. I have already * given some *Intimations* of the *Changes* which happen in the *interiour Parts* of the *Earth*, I mean the *Transitions* and *removes* of *Metalls* and *Minerals* there : and shewn of what *Use* and *Advantage* those *Changes* are to the *World* †. So that
 † *Ibid.*
Conf. 9. I may now pass freely on to consider those which befall the *exteriour*, or *Surface* of it. And these are brought about silently and insensibly ; and which is the constant Method of *Nature*, with
 all

all imaginable *Benignity* and *Gentleness*. Here is none of the *Hurry* and *Precipitation* none of the *Blustering* and *Violence*: no more than any of the direful and ruinous *Effects*, which must needs have attended those *Suppositious Changes*. And as these *Alterations* are not great, so neither are they *numerous*. I have made careful search on all hands, and canvass'd the Matter with all possible *Diligence*, and yet there are none that I can advance from my own *Observations*, but.

That the upper or outermost *Stratum* of *Earth*: that *Stratum* whereon Men and other Animals tread, and Vegetables grow, is in a perpetual *Flux*, and *Change*; this being the common *Fund* and *Promptuary* that supplies and sends forth *Matter* for the *Formation* of *Bodies* upon the *Face* of the *Earth*. That all *Animals*, and particularly *Mankind*, as well as all *Vegetables*, which have had *Being* since the *Creation* of the *World*, derived all the constituent *Matter* of their *Bodies* successively, in all *Ages*, out of this *Fund*.

That the *Matter* which is thus drawn out of this *Stratum* for the *Formation* of these *Bodies*, is at length

laid down again in it, and *restored back* unto it, upon the *Dissolution* of them ; where it lies ready to be again *assumed*, and *educed* thence for the *fitting forth* of other like Bodies, in a *continual Succession*.

That the *constituent Matter* of any one Body being *proper*, and turning thus naturally, when again *refunded* into this *Stratum*, to the *Constitution* of another like Body, there is a kind of *Revolution* or *Circulation* of it ; so that the *Stock* or *Fund* can never possibly be *exhausted*, nor the *Flux* and *Alteration* sensible.

That as the Bodies which arise out of this *Fund* are *various*, differing very much, not only from one another, but the *Members*, *Organs*, or *Parts* of each individual amongst themselves : so likewise is the *Matter* of this *Fund* whereof they all *consist*. For though when confusedly *blended* and *mingled*, as it is whilst lying in this *Stratum*, it may put on a *Face* never so uniform and alike, yet it is in reality very *different*, and consists of *several Ranks*, *Sets*, or *Kinds* of *Corpuscles*.

That all the *Corpuscles* that are of the *same Set*, or *Kind*, agree in every thing,

thing, and are most exactly *like* unto each other in all *Respects*. But those that are of *diverse kinds*, differ from one another, as well in *Matter* or *Substance*, in *Specifick Gravity*, in *Hardness*, in *Flexibility*, and several *other Ways*, as in *Bigness* and *Figure*. That from the various *Composures* and *Combinations* of these *Corpuscles* together, happen all the *Varieties* of the *Bodies* formed out of them: all their *Differences* in *Colour* and outward *Appearance*, in *Taste*, in *Smell*, in *Hardness*, in *specific Gravity*, and all other *Regards*; in much the same manner as that vast variety we see of *Words* arises from the various *Order* and *Composition* of the twenty four *Letters* of the Alphabet. But of *this Matter*, and of the *Process* and *Method* of *Nature* in the *Formation* of *Bodies* out of it, I shall treat more at large in the *Discourse* it self; wherein I shall also consider the *Opinions* of *Others*, particularly the *Ancients*, and, amongst the rest, of *Thales* and *Pythagoras*, about the *Elements* or *Principles* of *Natural Things*; for I now hasten to propose the *other Alterations* that happen in the *Terraqueous Globe*.

That *Rocks*, *Mountains*, and the
Q 3 other

other *Elevations* of the *Earth* (especially those whose *Surfaces* are yearly stirr'd and disturbed by digging, plowing, or the like) suffer a continual *Decrement*, and grow *lower* and *lower*; the superficial parts of them being by little and little wash'd away by *Rains*, and *born down* upon the subjacent *Plains* and *Valleys*. That even the *Stone* it self (whether naked and uncovered as in *Rocks*, or invested with a *Stratum* of *Earth* as is that in our ordinary *Hills*) is not, by its *Solidity*, privileg'd and secured against them, but is *dissolved* by degrees, and wash'd also down, in its turn, as well as the looser *Earth*.

3.

That the *Matter* which thus devolves from the *Hills* down upon the *lower Grounds*, does not considerably *raise* and *augment* them; a great part of it viz. the *vegetative* and *lighter Terrestrial Matter*, being either mounted up into the *Atmosphere* by the ascending *Vapour* *, or carried along with the *Rain-water* into *Rivers*, and, by them, into the *Sea* †; whence 'tis returned back again to the *Earth* dispersedly by *Rain* ‡, and serves for the *Nutritment* and *Formation* of the *Plants* which

* Vid. Part
3. Sect. 1.
Conf. 8.
† Conf.
Pag. 46.
§ seq. uti
§ Pag.
127. §
seq.

which grow thereon: and *the rest* of it, being more crass and ponderous, does not *move far*, but lodges in the Clefts, Craggs, and Sides of the Rocks or Mountains, and at or near the *Roots* or *Bottoms* of them.

That the *Stone* of *Rocks* and *Mountains* being by degrees in this manner dissolved, and the *Sand* born off, the *Shells*, and other *Marine Bodies* which were originally *included* therein *, are ^{* Part 2. Conf. 3.} by that means *let loose*, turned out, and exposed upon the *Surface* of the *Earth*. That 'tis for this reason that these *Marine Bodies* are now most commonly found upon *Hills*, and the *higher Grounds*; those *few* which are found *below* and at the *bottoms* of them, being for the most part only such as have *fallen down* from above, and from the *tops* of them. For those which were, at the time of the *Deluge*, reposed upon the *Surface* of the *Earth*, are most of them *perish'd* and gone ||. || ^{vid. pag. 64. & 65. supra.} And indeed *these*, which are yet *existent*, are *preserv'd* only accidentally, by their being at first *enclosed* in the *Strata* of *Stone*, and so secured by it as long as it was it self secure, I mean, until it was thus *dissolved*, and so

Q 4

could

could not any longer contribute any thing to their *Preservation*.

5. That these *Shells* and other *Bodies*, being thus *turned out* of the *Stone*, and *exposed* loose upon the *Surface* of the *Earth*, to the *Injuries* of *Weather*, and of the *Plough*, to be *trod upon* by *Horses* and other *Cattle*, and to many other *external Accidents*, are, in tract of time, *worn, fretted, and broken* to pieces.

That the *Shells* being so broken, struck off, and gone, the *Stone* included in them is thereby *disclosed* and set at liberty; which *Stone* consists of the *Sand* wherewith the *Cavities* of those *Shells* were filled when they were *sustained* together with it in the *Water* at the *Deluge* ||, and which at length subsided in them, and was lodged with them in the *Strata* of *Sand-stone*; the *Sand* contained within the *Shell* becoming *solid* and *consistent* at the same time that the *ambient*, or that of the *Stratum* without it, did †.

|| Part 2.
Conf. 2. & 3.

† Part 2.
Conf. 4.

That therefore the *Shells* served as *Plasms* or *Moulds* to this *Sand*; which, when *consolidated*, and afterwards in tract of time by this means *freed* from its *investient Shell*, is of the same *Shape* and

and *Size* as is the *Cavity* of the *Shell*, of what kind soever that *Shell* happened to be. That this is the true *Origin* of those *Stones* (consisting of *Sand* *) * Those which consist of Spar, Flint, &c. I have considered above, Part 4. Conf. 2. † Vulgarly Pectinitæ. which are called, by Authors, *Cochlitæ*, *Conchitæ*, *Muitæ*, *Ostracitæ*, *Ctenitæ* †, &c. and which are of constant regular, and specifick Figures; as are the *Cochlea*, *Concha*, and the other *Shells* in which they were moulded, and from which, by reason of their so near resemblance of the insides of them, they borrow their several *Denominations*.

That these *formed Stones* being by this means despoiled of their *Shells*, and exposed naked, upon the Surface of the ground, to the *Injuries* before recited, do also *themselves* in time decay, wear, and moulder away, and are frequently found *defaced* and *broken* to pieces; in like manner as the *Strata* of Stone wherein they were originally lodged first did: and afterwards the *Shells* wherein these *Stones* were enclosed and formed.

This *Deterration*, as 'tis called, or Devolution of Earth and Sand from the *Mountains* and *higher grounds*, is not in equal quantity and alike in all places, but *varies* according to the different

† which
are greater,
and fall
with more
Violence in
some Coun-
tries than
in others.
Vid. Part
3. Conf. 8.

ferent *height* of those *Mountains*, and to the *extent* of the *Plane* at top of them: to the different *consistence* and *durableness* of the *Strata* whereof they consist: and according as they are more or less disturbed by *Showers* †, *Plowing*, or other *Accidents*. Nay this *Deterration* varies in different parts of even the *same Mountain*; those which lye nearer to the *Brink* or *Margin* of it suffering a quicker and greater *Decrement* than those which are more remote therefrom, and towards the *middle* of it. But though this *Devolution* be thus different, 'tis not any where, even where greatest, very *considerable*; and therefore does not make any great *Alteration* in the Face of the Earth. This I have learn'd from *Observations* purposely made in several Parts of *England*; and when I shall, in the larger Work, propose the *Standard* whereby I give *Judgment* of it, any one may presently and easily inform himself of the *Quantity* and *Measure* of it, either *here*, or in any other part of the *World*.

There are indeed some other *Casualties* that the *Globe* is obnoxious unto; such as *Earthquakes*, and the burning
Moun-

Mountains, or *Vulcanoes*. But of *these*, I thank God, and the good Constitution of this happy Island, I have not had any opportunity of *Observation*. Yet something I have to offer concerning *these*, and the *Causes* of them, from the *Observations* of *others*. Not that the Thing is so very material, or that they make such havock, and *Alterations* in the *Globe* as some Men fancy. We have assurance from *History*, that *Ætna* and *Vesuvius* have sent forth Flames, by fits, for this two or three thousand years: and no doubt but they have done so much longer. And yet we see both *Sicily* and *Campania*, the Countries wherein those two Mountains stand, are still where they were: nay the very Mountains themselves are yet in *Being*, and have not suffered any considerable *Diminution* or *Consumption*, but are at this day the two *highest* Mountains in those Countries. What they have really suffered: by what means both *these*, and *Earthquakes*, are occasioned: and what are their *Effects* upon the *Globe*, shall be fully and carefully considered in due place. From which Considerations it will appear, that even *these* have

have their *Uses*: and that, although they do make some lesser *Alterations* in some few Parts of the *Earth*, and sometimes molest and incommode the Inhabitants of those Parts, yet the *Agent*, whereby both the one and the other is effected, is of that indispensable *Necessity* and *Use* both to the *Earth* it self, to *Mankind*, and to all other the *Productions* of it, that they could not *subsist* without it. I have already given some brief Intimations that *Winds* and *Hurricanes* at Land *, *Tempests* and *Storms* at Sea †, (things that have always been look'd upon with as evil an eye as Earthquakes, and pointed at as only disastrous and mischievous to the World) are yet not without a very necessary and excellent *Use*: the same have I also done concerning *Vulcano's* ||; but I must not dwell upon these things too long, wherefore I shall only now dispatch what is further necessary to be hinted here about this *Decrement* of *Mountains*, and then conclude this Part.

* Part 4.
Conf. 14.
pag. 214.
† V. Pag.
47, 48. &c.

|| Part 3.
Sect. 1.
Conf. 13

And *this*, as it does not make any great *Alteration*, so neither doth that, which it really does make, any ways *endamage* or disorder the *Globe*. 'Tis
not

not any the least *Detriment* or *Disadvantage* to the *Productions* of it, to *Vegetables*, to *Animals*, and particularly to *Mankind*. Nor does it thwart and interfere with the grand *Design* of *Providence*, viz. the *Conservation* of the *Globe*, and the *Propagation* of *Bodies* upon it, for the *use* of *Man*. So far from this, that it is very highly *beneficial* and *serviceable* to both; which will farther appear if we consider,

That in the *first Ages* after the *Deluge*, when the *Number* of *Mankind*, of *Quadrupeds*, and of the other *Animals* was but *small*, the *Vallies* and *Plains* were more than sufficient for their *Habitation* and *Use*. And, by such time as that *Stock* of them was *enlarged*, that they were further spread and *multiplied*, and thereby the *Earth* so far peopled and replenish'd that the *Hills* and higher *Grounds* began to be *needed*; those *Rocks* and *Mountains* which in the *first Ages* were *high*, *steep*, and *craggy*, and consequently *then* inconvenient and unfit for *Habitation*, were by this continual *Deterioration* brought to a *lower pitch*, rendered more *plain* and *even*, and reduced

ced nearer to the *ordinary Level* of the *Earth*. By which means they were made *habitable* by such time as there was *occasion* for them: and *fit* for *Tillage*, for the Production of *Vegetables*, of *Corn*, and other *Necessaries*, for the use of their *Inhabitants*.

That although the *principal Intention* in the *Precipitation* of the *Vegetative* *Terrestrial Matter* *, at the *Deluge*,
 * Part 2. pag. 88, 89. and the *burying* it in the *Strata* underneath, amongst the *Sand*, and other *mineral Matter*, was to *re-trench* and *abridge* the *Luxury* and *Superabundance* of the *Productions* of the *Earth*, which had been so *ingrately* and *scandalously* abused by its former *Inhabitants*, and to cause it to deal them forth for the future more *frugally* and *sparingly*; yet there was a still *farther Design* in that *Precipitation*: and the *Matter* so *buried* was to be *brought up* upon the *Stage* once more; being only reserved in *store* for the benefit of *Posterity*, and to be, by this *Deterration*, fetch'd out to *light* again to supply the *Wants* of the *latter Ages* of the *World*. For had these *Strata* of *Stone*, and other *mineral Matter*, which lay then *underneath*,

neath, been altogether destitute of this *Vegetative Intermixture*, and had not contained some, though a smaller and more parsimonious *Supply* of it in them: had there not been also vast numbers of *Shells, Teeth, Bones*, and the like, lodged in them, which are, when rotted and dissolved, † a proper ^{† Vid. Consect. 5. supra.} and natural *Manure* to the *Earth*, as all Parts whatsoever of Animals, as well as Vegetables, are; they consisting of such Matter as the upper and *Vegetative Stratum* it self contains, and therefore such as is fit for the Constitution of Plants and of Animals *; I say, ^{* Confer. Conf. 1. supra.} had it not been for *this*, when the *upper* and *Vegetative Stratum* was once wash'd off, and born down by Rains, the Hills would have become all perfectly barren, the *Strata* below yielding only meer *steril* and mineral Matter, such as was wholly inept and improper for the Formation of *Vegetables*. Nay, the *Inconvenience* would not have stop'd there, but have spread it self much farther. For had the *Vegetative Stratum* been carried off, the *Devolution* still continued, and so the Matter of the *lower* or *mineral Strata* been likewise by degrees borne down
suc.

successively to the *Roots* and *Bottoms* of the *Hills*, and upon the neighbouring parts of the *Valleys* and *Plains*; it would, as far as it reach'd, have *cover'd* and *buried* the *upper* and *vegetative Stratum* that was expanded over those *Valleys* and *Plains*, and render'd as much of them as it so covered also frustrate, *steril*, and *unfruitful*. So that by this means, in the *latter Ages* of the *World*, when the *Earth* should be fully *peopled*, and all *Quarters* and *Corners* of it *stock'd* with *Inhabitants*, and when consequently there would be the *greatest need* and occasion for its *Productions* every where, for supply of the *Necessities* of these its *numerous Inhabitants*, there would have been then *much less* than ever; a great part of the *Earth* being rendered entirely *barren*. So that they might have e'en *starved*, had it not been for this *Providential Reserve*: this *Hoord*, if I may so say, that was stowed in the *Strata* underneath, and now seasonably *disclosed* and brought forth.

PART VI.

*Concerning the State of the Earth,
and the Productions of it, before
the Deluge.*

THE Thread of this *Discourse* draws now near to an *End*: and I have reason to fear that, by this time, the Reader, as well as my self, thinks it high time that it were quite spun out. For which reason I shall not any longer presume upon his Patience farther than needs I must.

In the five foregoing *Parts* of this *Essay* I lay down what I have to propose relating to the *Condition* of the *Earth* during the *time* of the *Deluge*, and ever since that time. And here I am to make a Stand: to look a great way back: and make some *Reflections* upon the Posture of Things before the *Deluge*.

The Method I take may perhaps be censured by some as preposterous, because I thus treat last of the *Antediluvian Earth*, which was first in order of Nature. But they will, I hope, let fall that Censure, when they are acquainted that 'tis a thing of Constraint, and not of Choice: and that 'twas for want of Footing, and good ground to go upon, that I did not take *that Earth* under Consideration sooner. The truth is, there was no way for me to come to any competent Knowledge of it, or to give any sure Judgment concerning it, but meerly by *Induction*: and by Contemplation of the *Shells, Bones, and other Remains* of it, which are still in being. Now before I could inferr any thing from *these*, it lay upon me to make out that they all belonged to *that Earth*, and were the genuine *Products* of it: to shew likewise how they became buried and disposed in the manner we now find them: and by what means they were preserved till now. And *that* is what I have been hitherto about; so that this is indeed but the proper place for this Disquisition concerning the *Antediluvian Earth*: and
it

it could not well have been brought in before.

Had there not been *still remaining* a great many *Animal* and *Vegetable Bodies* that were the legitimate Offsprings of *that Earth*, 'twould have been an extravagant and impracticable Undertaking to have gone about to have determined any thing concerning it; and the more so because the *Earth* it self was *dissolved* and *destroyed* *. * Part 2. Conf. 2.
But I prove that there are such *Remains* of it, enclosed in great plenty in the *Marble*, *Stone*, and the other compacter *Strata* of the *present Earth*; whereby they have been preserved, through so many *Ages*, quite down to our *Times*: and are like to endure, many of them, much longer; even as long as the *Strata* themselves continue in the *Condition* they now are; and so will be a sure and lasting *Moument* and *Evidence* of the *Truth* of that extraordinary Accident (the *Destruction* of the *Earth* and of *Mankind* by the *Deluge*) to *Posterity*, quite down to the *End* of the *World*.

Now because the *Observations* which I make use of in the former *Parts* of this *Work* give an *Account* of

the said *Productions* thus preserved, I proceed upon those Observations, as hitherto, and, by *Inferences* which easily, clearly, and naturally flow from them, shew what was the *Condition* and State of *that Earth*, and wherein it differ'd from *this* we now inhabit.

And in regard that, from a *Theory* which, how much soever it may relish of Wit and Invention, hath no real *Foundation* either in Nature or History, the *Author* so often mentioned already hath set forth an *imaginary* and *fictitious Earth*: whose *Posture* to the *Sun* he supposes to have been much *different* from *that* which the *Earth* at *present* obtains, and *such* that there could be no *Alteration* of Heat and Cold, Summer and Winter, as now there is, but a constant *Uniformity* of

† *Theory of Weather and Equality of Seasons* †:
the Earth, An *Earth* without any *Sea*: without
 l. 1. c. 6. & *Mountains*, or other *Inequalities* ||:
 l. 2. c. 3. || L. 1. c. 5. and without either *Metalls* or *Mine-*
 * *Ibid.* *rals* *: in few words, *one* perfectly un-
 l. 2. c. 6. like what the *Antediluvian Earth* was
 in truth and reality: and perfectly
 unlike that which *Moses* hath repre-
 sented; I shall therefore interpose
 some *Conjectaries* which would have
 been

been otherwise needless and superfluous: which are directly levelled against these *Mistakes*: and evince that wherever he hath receded from the *Mosaick Account of that Earth*, he hath at the same time also receded from *Nature*, and matter of *Fact*; and this purely from the aforesaid *Observations*; from which I shall prove,

That the *Face of the Earth*, before the Deluge, was *not smooth, even, and uniform*: but *unequal*, and distinguish'd with *Mountains, Valleys, and Plains*: as also with *Sea, Lakes, and Rivers*. I.

That the *Quantity of Water* upon the Surface of the Globe was nearly the same as now: the *Ocean* of the same *Extent*, and possess an equal share of the *Globe*; intermixing with the *Land* so as to checquer it into *Earth* and *Water*, and to make much the same *Diversities* of *Sea* and *Land* that we behold at present. 2.

That the *Water* of the *Sea* was saturated with *Salt*, in like manner as now it is. That it was agitated with *Tides*, or a *Flux* and *Reflux*: with *Storms* and other *Commutations*. 3.

That the *Sea* was very abundantly replenished with *Fish* of all *Sorts*: as 4.

well of the cartilaginous and squamose, as of the testaceous and crustaceous kinds: and that the *Lakes* and *Rivers* were as plentifully furnish'd with Lake and River-Fish of all sorts.

5. That the *Earth* was very exuberantly beset with *Trees*, *Shrubs*, and *Herbs*: and stock'd with *Animals*, of all kinds, *Quadrupeds*, *Fowls*, and *Insects*: and this on all *Sides*, and in all *Parts* of it, quite round the *Globe*.

6. That the *Animal* and *Vegetable Productions* of the *Antediluvian Earth* did not in any wise differ from those of the *present Earth*. That there were then the very same *Kinds* of *Animals* and *Vegetables*, and the same subordinate *Species* under each *Kind* that now there is. That they were of the same *Stature* and *Size*, as well as of the same *Shape*: their *Parts* of the same *Fabrick*, *Texture*, *Constitution*, and *Colour*, as are those of the *Animals* and *Vegetables* at this day in being.

7. That there were both *Metalls* and *Minerals* in the *Antediluvian Earth*.

8. That the *Terraqueous Globe* had the same *Site* and *Position* in respect of the *Sun* that it now hath. That its *Axis* was not parallel to that of the
Eclip-

Ecliptick, but *inclined* in like manner as it is at *present*: and that there were the same *Successions* of *Heat* and *Cold*, *Wet* and *Dry*: the same *Vicissitudes* of *Seasons*, *Spring*, *Summer*, *Autumn* and *Winter*, that *now* there is.

It hath been already noted, that these *Propositions* are founded on *Observations* made upon the *Animal* and *Vegetable Remains* of the *Antediluvian Earth*. From those *Remains* we may

judge what sort of *Earth* *that* was: and see that it was not much different from

this we now inhabit *.

Now though 'tis not to be expected that I here for-

mally lay down those *Observations*,

that being not the *Business* of *this Tract*,

yet untill I have Opportunity both of

doing so, and of shewing in what

manner the foregoing *Propositions* flow

from them, it may be very conveni-

ent that I give some short *Directions*

how the Reader, for his present Satis-

faction, may, of himself, and without

my Assistance, make out the principal

Articles of these *Propositions* from the

Observations already delivered in the

several Parts of this Discourse, and

from one or two more that I shall add

upon this Occasion. And that he may

at one View discover how consonant the *Account* which *Moses* hath left us of the Primitive Earth, is to *this* which we have from *Nature*, and how much the late *Theory of the Earth* differs from both, I will set down that Writer's Sense of the Matter under each Head as we pass along.

|| Conf.
Part 2.

† Gen. 1.
9, 10.

To begin therefore with the *Sea*; That there was *one* before the Deluge, there needs not, I think, any other Proof than the *Productions* of it yet in being: the *Shells*, the *Teeth*, and *Bones of Sea Fishes* ||. And for *Moses*, he is not at all averse hereto; but as expressly asserts that there was then a *Sea*, as the *Theory* does that there was none. Take it in his own words. † And God said, Let the Waters under the Heaven be gathered together unto one place, and let the Dry-land appear: and it was so. And God called the Dry-land Earth, and the gathering together of the Waters called he *SEAS*: and God saw that it was good. And though the *Theorist* flatly denies that there was then any such thing, yet he does not go about to dispute the Translation of this † L. i. c. 7. Passage, but readily owns*, that *Moses* hath here used a word that was common.

mon and known to signifie the Sea. According to *him* therefore, we see the Sea: was formed at the *beginning* of the *World*, and after its Formation approved of as *good*: that is, very necessary and serviceable to the Ends of Providence in the Kingdom of Nature; and this indeed it is so many ways, that it must needs be granted that *that* would have been a very wild World had it been without any Sea. The *separating* of the *Sea* and *Land*, and determining the set *Bounds* of each, is here † reckoned part of the Work of the † *Vers. 13.* third Day: as the stocking of the *Sea* with *Whales* and other *Fishes*, is || of || *Vers. 21,* the fifth. *And God created great Whales,* ^{22.} &c. *and blessed them, saying, be fruitful and multiply, and fill the Waters in the S E A S.* And when on the sixth Day the finishing Hand was set to the Work, and Man created, God gives him *Dominion over the Fish of the S E A **, * *Vers. 28.* 'Twould have been but a scanty and narrow Dominion, and *Adam* a very mean Prince, had there then been neither any *Fish* existent, nor *Sea* to contain them. Nay, this had been little better than a downright Illusion and abusing of him: and what is more, *that*

that World had been so far from excelling *ours* in the Abundance of its *Productions*, which is what the *Theorist* contends for on another Occasion, that 'twould have fallen far short of it: have wanted a very noble and large share of the Creation which we enjoy: been deprived of a most excellent and wholesome Fare, and very many delicious Dishes that we have the use and benefit of. But the Case was really much otherwise: and we have as good proof as could be wish'd that there were not any of these wanting. The things, many of them yet extant, speak aloud for themselves: and are back'd with an early and general *Tradition*. For *Moses* is so far from being singular in thus relating that the Sea is of as *old* a *Date* and *Standing* as the *Earth* it self is, that he hath all, even the first and remotest *Antiquity* of his side; the *Gentil Account* of the Creation making the *Ocean* to rise out of the *Chaos* almost as soon as any thing besides. But we have in store a yet further *Testimony* that will be granted to be beyond all Exception. 'Tis from the mouth of *God* himself, being part of the *Law* promulgated by him in a most solemn

solemn and extraordinary manner. *Exod. 20 11. In six days the Lord made Heaven and Earth, the S E A, and all that in them is.* 'Tis very hard to think the *Theorist* should not know this: and as hard that, knowing it, he should so openly dissent from it.

Then for the *Dimensions* of the *Sea*; that it was as *Large*, and of as great *Extent* as now it is, may be inferr'd from the vast *Multitudes* of those *Marine Bodies* which are still found in *all Parts* of the known *World* †. Had *these* † *Conf.* been found in only one or two places: *Pag. 5, & 6. & Part 2.* or did we meet with but some few *Species* of them, and such as are the *Products* of one *Climate* or *Country*, it might have been suspected that the *Sea* was then, what the *Caspian* is, only a great *Pond* or *Lake*, and confined to one part of the *Globe*. But seeing they are dug up at *Land* almost *every where*, and in at least as great variety and plenty as they are observed at *Sea*: since likewise the *fossil Shells* are many of them of the *same kinds* with those that *now* appear upon the *neighbouring Shores*, and the rest such as may well be presumed to be living at the bottom, or in the interior and deeper *Parts*

† Conf.
Pag. 25.
supra.

Parts of the *adjacent Seas* †, but never any that are peculiar to *remoter Seas*, or to the Shores of *distant Countries*, we may reasonably conclude, not only that the *Sea* was of the *same Bigness* and *Capacity* before the *Deluge*, but that it was of much the *same Form* also, and interwoven with the *Earth*, in like manner as at this time: that there was *Sea* in or near the very *same Places* or *Parts* of the *Globe*: that *each Sea* had its *peculiar Shells*, and those of the *same Kinds* that now it hath: that there was the *same diversity* of *Climates*, here warmer and more agreeable to the *Southern Shells*, there colder and better suited to the *Northern ones*: the *same variation* of *Soils*, *this Tract* affording such a *Terrestrial Matter* as is proper for the *Formation* and *Nourishment* of *one sort* of *Shell-fish*, *that* of *another*: in few words, much the *same Appearance* of *Nature*, and *Face* of *Things* that we behold in the *present Earth*. But of this more by and by.

That the *Water*, of the *Sea* was *salt*, as *now* it is, may be made out likewise from those *Shells* and other the *Productions* of it. For they are of the *same Constitution*, and consist of the

the same sort of *Matter* that do the Shells at *this day* found upon our *Shores* *. And particularly such of them as remain found and unperish'd yield, upon Tryal, a true *Marine Salt*: in like manner as *these* also do. The *Salt*, wherewith the *Sea-Water* is saturated, is part of the *Food* of the *Shell-Fish* residing therein, and a main *Ingredient* in the Make of their *Bodies*; they living upon *this*, and upon the *Mud* and other *Earthy Matter* there. Now that *that Sea* was *Salt*, there needs not I think a fuller Proof than that the *Shells* which are owing to it thus retain still in them a real *marine Salt*.

And that the *Sea Ebbed and Flowed* before the Deluge, may be inferr'd, not so much from the Necessity of *that Motion*, and the many and great *Uses* of it in the Natural World †, as from certain *Effects* that it had upon the *Shells*, and other like *Bodies* yet preserved. 'Tis known that the *Sea*, by this Access and Recess, shuffling the empty *Shells*, or whatever else lies exposed upon the *Shores*, and bearing them along with it backwards and forward upon the *Sand* there, *frets* and *wears*

* Vid. pag.

21, 22. &

23. supra.

† Conf.

pag. 47.

& 155.

wears them away by little and little, in tract of time reducing those that are concave and gibbose to a flat, and at length grinding them away almost to nothing. And there are, not uncommonly, found *Shells* so worn enclosed, amongst others, in *Stone*.

As the *Sea-shells* afford us a sure Argument of a *Sea*, so do the *River-Shells* of *Rivers* in the *Antediluvian* Earth. And if there were *Rivers*, there must needs also have been *Mountains*; for they will not flow unless upon a *Declivity*, and their Sources be raised above the Earth's ordinary Surface, so

that they may run upon a *Descent* *; the *Swiftiness* of their *Current*, and the *Quantity* of *Water* refunded by them, being proportioned generally to the *Height* of their *Sources*, and the *Bigness* of the *Mountains*

* Part 3. Sect. 1. Pag. 152. & 153. *supra*. The Theorist, I know, supposes both the *Antediluvian* and the present *Earth* to be of an *Oval Figure*, and protended towards the *Poles*; as thinking that such a *Figure* would afford him a *Plane* so much inclined towards the *Æquator*, that the *Rivers* might flow upon it though there were no *Mountains*. But 'tis plain they could not. Nor are there any the least *Grounds* to believe that the first *Earth* was of that *Figure*. If he had had any thing that had look'd like a *Proof* of it, he had done well to have produced it. But 'tis manifest though we imagine the *Earth* formed that way he proposes, it would not have fallen into any such *Figure*. And for the present *Earth*, 'tis of a *Figure* as different from that which he assigns as it well could be; it being a *Sphæroides Prolatus*, as appears from the late *Discoveries* concerning it.

out

out of which they arise. *Mountains* being proved, nothing need be said concerning *Valleys*; they necessarily following from that Proof, as being nothing but the Intervalls betwixt the Mountains. But let us see what *Moses* hath on this Subject *. *And the Waters* (he is treating of the Deluge) *prevailed exceedingly upon the Earth; and all the HIGH HILLS that were under the whole Heaven were covered. Fifteen Cubits upwards did the Waters prevail; and the MOUNTAINS were covered. And all flesh dyed: --- all in whose Nostrils was the breath of Life.* The Theorist averrs that there were no *Mountains* in the first *Earth*: and therefore would have *this* to be understood of *those* which were raised afterwards. But that cannot be. For the Historian here plainly makes *these Mountains* the *Standards* and *Measures* of the *Rise* of the *Water*; which they could never have been had they not been *standing* when it did so *rise* and overpour the *Earth*. His Intention in the whole is to acquaint us that all Land Creatures whatever, both Men, Quadrupeds, Birds and Insects, perish'd, and were destroyed by the Water,
Noah

* Gen. vii:
19. & seq.

Noah only excepted, *and they that were with him in the Ark.* And at the same time, to let us see the *Truth and Probability* of the Thing: to convince us that there was no way for any one to escape, and particularly that none could save themselves by climbing up to the tops of the *Mountains* that then were, he assures us that *they*, even the highest of them, were all covered and buried under *Water*. Now to say that there were then *no Mountains*: and that *this* is meant of *Mountains* that were not formed till *afterwards*, makes it not intelligible, and indeed hardly common Sense.

The extreme *Fertility* of both Sea and Land before the Deluge, appears sufficiently from the vast and almost incredible *Numbers* of their *Productions* yet extant *; not to insist upon those which are long ago rotted and gone †. Nor need we much wonder at this their *abundant Fruitfulness*, when we know from what Source it proceeded; which our Historian hath opened to us in very significant words *. *And God said, let the Waters bring forth abundantly the moving Creature that hath life &c. --- And God blessed them, saying,*

* Vid.
Part 2.

† Conf.
Pag. 31.
65. 77. &
Part 3.
Sect. 2.
Conf. 11.
* Gen. i. 20.
& seq.

ing, be fruitful and multiply, and fill the Waters in the Seas : and let Fowl multiply in the Earth, &c. Here was we see a Blessing, handed out with the first Pairs of Animals at the moment of their Creation, very liberal and extensive; and it had effect with a Witness. A Man that does but behold the *mighty Sholes of Shells*, to take *them* for an *Instance*, that are still remaining, and that lye bedded and cumulated in many places *heap upon heap*, amongst the ordinary Matter of the Earth, will scarcely be able to believe his Eyes, or conceive which way *these* could ever live or subsist one by another. But yet subsist they did : and, as they themselves testifie, well too; an Argument that *that Earth* did not deal out their *Nourishment* with an over-sparing or illiberal Hand.

That these *Productions* of the *Original Earth*, differ not from those of the *Present*, either in *Figure*, in *Magnitude*, in *Texture*, or any other respect, is easily learn'd by comparing of them.

The exact *Agreement* betwixt the *Marine Bodies* I have shewn already, and shall in due place shew the same of the *Terrestrial ones*.

* Pag 21,

22. Conf.

Gen. i. 11,

12, 21, 24,

25. & vi.

20.

S

And

And as there were such great Numbers of Animals and Vegetables in the *Primitive Earth*, so that there were also *Metalls* and *Minerals*, and these in no less *plenty* than in *ours*, is very clear from what hath been delivered in the *Fourth Part* of *this Essay*, which need not be repeated here. Nor is

† Gen. iv. 22. *Moses* defective in this Point †. And *Zillah*, she also bare *Tubal-Cain*, an Instructor of every Artificer in *Brass* and *Iron*. The *Theorist*, quite contrary, says, *As for Subterraneous Things, Metalls and Minerals, I believe they had none in the first Earth; and the happier they; no Gold, nor Silver, nor coarser Metalls.* Amongst these coarser *Metalls* are *Copper*, or *Brass*, and *Iron*. Now if there were none of these, 'tis a great Mystery to me, I confess, how *Tubal-Cain*, who certainly died either before or at the Deluge *, could ever have taught the Workmanship and Use of them. And yet if this *Theory* be true, there neither was nor could be any within their reach, or that they could ever possibly come at. For the truth of the *Theory* I am in no wise concerned: the *Composer* of it must look to

* Confer.
Gen. vii.
23. &
1 Pet. iii.
20.

to that ; but that there were really both *Metalls* and *Minerals* before the *Deluge*, is most certain. For besides the Testimony that we have of the Thing from *Nature*, and the Passage already alledged out of *Moses*, there is another for which we are also obliged to the same Author, that acquaints us there were both even in *Paradise* it self.

'Tis in his second Chapter *. *The name* * *Gen. ii.*
of the first River is Pison : that is it ^{11, 12,}
which compasseth the whole Land of Havi-
lah, where there is Gold. And the Gold
of that Land is good : there is Bdelium
and the Onyx-stone. He speaks here, I
 grant, only in the Present Tense, *there*
is Gold : but must mean not only that
 there was Gold and Gemms there in
his time, but that there was so like-
 wise from the *beginning* of the *World*,
 of which he is giving an Account in
 these two Chapters, or, with Submis-
 sion, I conceive 'twould not be any
 thing to his purpose. He is here speak-
 ing of *Paradise* ; which he represents
 as a most charming and delightful
 Place : besett with every Tree that is
 pleasant to the sight, and good for food † : † *verse. 9.*
 watered with refreshing Streams and

excellent Rivers: and abounding with Things not only useful and convenient, but even the most rare and valuable, the most costly and desirable: particularly *Gold*, *Precious Stones*, and *Perfumes*; which were all much esteemed and admired by the *Jews*, to whom he wrote this. Nor is it any Paradox, notwithstanding that *Dissolution* of the
* Part 2. *Earth* which happened at the *Deluge* *, to suppose there was this or that *Metal* or *Mineral* in the *same Part* of the *Globe* afterwards where it was before *that* happened. The *Water* of the *Abyss* indeed changed its *Place*, during the time: So did the *Sea*, and bore the *Bodies* it contained, many of them, out along with it. But for the *Terrestrial Parts* of the *Globe*, *Metals* *Minerals*, *Marble*, *Stone* and the rest, they, though dissolved, and assumed up into the *Water*, did not *flitt* or *move* far, but, at the general Subsidence, settled down again in or near the *same Place* from which they were before taken up. For the *Water* was all out upon the *Face* of the *Earth* before ever *these* stirr'd, or were fetch'd up out of their native *Beds*: and they
were

were all sunk down into the same Beds again, before the Water began to shift away back to its old Quarters; so that it could not contribute any thing to the Removal of them. Even the very *Vegetables*, and their *Seeds*, which were many of them naturally lighter than the Water, assisted by the heavier Terrestrial Matter that had in this Jumble and Confusion fasten'd and stuck to them, fell all to the bottom: and the *Water* was in great measure *clear*, and disengaged from the *Earthy Mass*, before it went off. And 'twas well it was so; for had the *Mineral Matter* of the *Globe* not been held to its *former Station*, but hurried about and *transposed* from place to place, 'tis scarcely to be conceived how many and great *Inconveniences* it would have occasioned. The same likewise for *Vegetables*. Had the *Seeds* of the *Pepper Plant*, the *Nutmeg*, the *Clove*, or the *Cinnamon Trees*, been born from *Java*, *Banda*, the *Moluccoes*, and *Ceylon*, to these *Northern Countries*, they must all have *starved* for want of *Sun*. Or had the *Seeds* of our *colder Plants* shifted thither, they wou'd

have been burnt up and spoil'd by it. But *Things* generally kept to their proper Places: to their old natural Soil and *Climate*; which had they not done, all would have been confounded and destroyed. 'Tis true, the *Vegetables*, being comparatively *lighter* than the ordinary Terrestrial Matter of the Globe, subsided *last* †; and consequently lying many of them upon the *Surface* of the *Earth*, those which were of considerable *Bulk*, as the bigger sorts of *Trees*, which had large and spreading Heads, would lye with their Branches stretch'd up to a great height in the *Water*, (and, when *that* was withdrawn, in the Air ||,) and so being very much in the *Waters* way, when it began to depart and retire back again, would be apt to be removed and driven forward along with it, especially those which lay in such places where the *Current* happened to run strong. Accordingly we now find of *these Trees* in the *Northern Islands*, and the other bleaker and colder *Parts* of the *Earth*, where none now do, or perhaps ever did, grow *. And *there* they are of mighty *Use* to the *Inhabitants*, afford-

† Confer.
Part 2.
Consect. 3.

|| In which
Posture 'tis
probable
the Olive-
Tree lay
from which
the Dove
pluck'd off
the Leaf
that she
brought
unto Noah,
Gen. viii.
11.

* Conf.
pag. 112.
supra.

affording them a Supply of *Timber* which their own Country doth not yield, and which they employ not only for *Fewel*, which yet is much needed in those *cold Countries*, but for *Building* likewise, and many other *Purposes*. Whereas in the *Places* whence they were thus driven they would have been *useless*, yea but an *Incumbrance*, and might be easily spared. For as long as the *Seeds* remained behind, lodged in a natural and agreeable Soil, all was safe enough; they would soon vegetate, and send forth a *new Sett* of *Trees* there, so that 'twas not much matter what became of the *Old ones*. But to the *Parts* whereunto the *Trees* were thus removed, they are of great *advantage*. And, which is in truth very remarkable, and an *Argument* that there was something more than meer *Chance* in this *Affair*, there are hardly any *Countries*, especially in the *Northern* and *colder Climes*, that are destitute of *Timber* of their own *Growth*, which have not a very large *Supply* of these *Stray-Trees*, if I may so call them. But to proceed. After that the *Terrestrial Matter* was once sunk down

into its several Beds, and well settled there, the *Mountains* were cast up, and the *Springs* and *Rivers* burst forth, in such Numbers, and at such Distances from one another, in *all Parts* of the *Globe*, as best answered the *Necessities* and *Expences* of *each*: and therefore undoubtedly in much the *same Places* that they were before the *Deluge*. All Things were so contrived and ordered in the *re-fitting* up the *Globe* at this time, that they might best execute and perform each their several *Ends* and *Offices*. There were the same *Measures* taken, and the same *Process* used in this *Re-Formation* of it, that were us'd when 'twas *first built*: and much such an *Earth* arose out of the *Deluge*, as at the *Creation*, sprung out of *Nothing* || But the Reader will more clearly discover all this, with the *Reasons* of it, if he give but himself the trouble to compare *Part 2. Cons. 2. & seq. Part 3. Sect. 1. pag. 153. & seq. & Sect. 2. Cons. 2, 3, & 7. Part 4. Cons. 3. & Part 6. Cons. 9.* This premised, 'twould be, I think, not strange should we find *Paradise* at this Day, where *Adam* left it: the same *Rivers*:
the

|| Vid. pag.
96. supra.

the same *Face* of the *Ground*: the same *Metalls* and *Minerals*, that *then* there were. And I the rather Note this, because I see there are some so earnest in quest of it. Learned Men have been now a long time a searching after the happy Country from which our first Parents were exiled. If they can find it, with all my heart: and there have been some that have sought it with that Industry that I think they deserve it for their pains whenever they make the Discovery. To deal freely, I am of opinion there's no part of the *present Earth* that does come up fully to the *Mosaick* Description of *Paradise*. The Country about *Babylon*, or *Bagdet*, bids fairest for it: and I am persuaded that it was thereabouts. But if so, whoever shall compare this Country, as *now* it stands, with *that* Description, will find that it sustained some *Alterations* from the *Deluge*, perhaps *more* than any Part of the *Earth* besides. And there's an obvious *Reason* why it should. There was a *Paradise before*, but was to be none *after* the *Deluge*. The *Case* was *altered*, and the *Reason* of the thing *ceased*.

ceased. So that *all* that denominated it *Paradise*, and that *distinguish'd* it from the *rest* of the *Globe*, was *lop'd off* by the *Deluge*: and *that* only left which it enjoyed in common with its neighbour Countries. Upon the whole, 'tis, I think, apparent that what I offer in this Discourse is so far from doing any Diskindness to the Cause these Gentlemen are, and have been so long, engaged in, that it does them a real Service, and helps them out with the main thing whereat they stuck: fairly solving all *Difficulties* in the *Mosaick* Relation of *Paradise*. Wherefore now to proceed to the last Head to be discuss'd, the *Vicissitude* of *Seasons*, Summer and Winter, Hot and Cold, in the *Antediluvian* World.

And that there really was such a *Vicissitude* we need not go any further for proof than to the aforesaid *Animal* and *Vegetable* Bodies still preserved; the general Tenour of them speaking it out so plainly as to leave no room for doubt. There are, we know, some sorts of *Vegetables* which consist of *Particles* very *fine*, *light*, and *active*: and which therefore require only a *smaller*

Smaller degree of Heat to raise them ^{** Vid. Part.}
from out the Earth up into the Seeds, ^{3. Sect. 1.}
Roots or Bodies of those Vegetables, ^{Conf. 8.}
for their growth and nourishment. ^{Pag. 124.}
So that for the raising of *these*, the
Suns Power, when only *lesser*, is *suffici-*
ent. And therefore they begin to
appear in the earlyer Months, in *Fe-*
bruary and *March*; when they first
peep forth of the Ground: after a
while they display themselves, shew-
ing their whole Tire of *Leaves*: then
their *Flowers*: next their *Seeds*: and
lastly when, in the following Months
April and *May*, the *Sun* is farther ad-
vanc'd, and (to speak in the Phrase of
the *Vulgar*, which I choose all along
for the sake of plainness) hath gained
a greater strength, the *Heat* becomes
too powerful and boisterous for them;
it now mounting up the Terrestrial
Matter with such *force* and *rapidity*,
that the *Plants* cannot assume that
part of it which is proper for their
Nourishment, as it passes through
them, nor incorporate it with them,
as before they were wont when it
pass'd more gently and leisurely. Nay
the *Heat* at length grows so *great*,
that

that it again *dissipates* and bears off those very *Corpuscles* which before it brought; the *Parts* of these *Plants* being very *tender*, as consisting of *Corpuscles* which are extremely *small* and *light*, and therefore the more easily *dissipable*. So that *then* these *Plants* dye away, shrink down again into the Earth, and all, save only their *Roots* and *Seeds*, *vanish* and *disappear*. But when the *Sun's Heat* is thus far *advanc'd*, 'tis but just come up to the pitch of another *Sett* of *Vegetables*: and but great enough to excite and bear up the *Terrestrial Particles*, which are more *crass* and *ponderous*. And therefore those *Plants* which consist of *such*, begin *then* to shoot forth, and display themselves. So that the Months of *April* and *May* present us with another *Crop* and *Order* of *Plants*. For the same reason also, *June*, *July*, and *August* go farther, and exhibit a still different *Shew* of *Vegetables*, and *Face* of *Things*. But when, in the Months of *September* and *October*, the *Sun's Power* is again *diminish'd*, and its *Heat* but about equivalent to *that* of *March* and *April*, it again suits the *Plants* which

which were *then* in season, so that they many of them spring up a fresh in *these* Months, and flourish over a-new, in like manner as before they did in *those*; till being check'd by the *Cold* of the succeeding *Winter*, the *Sun* being gone off, and having now no longer *Power* great enough to bring up and supply them with fresh Matter, they presently begin to *decline* for want thereof, and at length quite dwindle away and *disappear*, untill the Arrival of the *Spring Season*, when they take their *Turns* over again as formerly. Yea the more *tender* and *fugitive* *Parts*, the *Leaves*, and the like of many of the more *sturdy* and *vigorous* *Vegetables*, *Shrubs*, and *Trees*, suffer the same Fate, and *fall off* for want of the Supply from beneath; those only which are more tenacious, consistent, and hardy, enduring the Brunt, and making a shift to subsist for the time without such Recruit and Reparation. 'Tis therefore, we see, most apparent that this *Succession* of *Things* upon the Face of the Earth, is purely the Result and Effect of the *Vicissitude* of *Seasons*: and is as constant and certain
as

as is the *Cause* of that *Vicissitude*, the *Sun's Declination*: so certain, that were a Man kept for some time blind-fold, in such manner that he could have no Notice how the *Year* pass'd on and were at length turn'd forth into the next Field or Garden, he would not need any other Almanack to inform him what *Season* of the Year it then was.

But if instead of this *Variation* of *Heat*, we suppose that there was an *Equality* or constant *Temperature* of it before the *Deluge*, which is what the *Theorist* contends for, the Case would be very much altered, and *that* altogether for the worse. A Man can hardly at first imagine what a *Train* of ill *Consequences* would follow from such a Condition and Posture of Things; of which 'twould not be the least that such a Mediocrity of Heat would deprive the World of the most beautiful and the most useful Parts of all the whole Creation: and would be so far from exalting the Earth to a more happy and Paradisiacal *State*, which is what he brought it in for, that 'twould turn it to a
general

general *Desolation*, and a meer barren *Wilderness*, to say no worse. Such an *Heat* would be too *little* for some *sorts* of *Vegetables*, and too *great* for others. The more *fine* and *tender* *Plants*, those which will not bear a degree of *Heat* beyond that of *April*, would be all *burnt* up, and *destroyed* by it; whilst it could never reach the more *lofty* and *robust*, nor would there be near *Heat* enough to ripen their *Fruits* and bring them to *Perfection*. Nothing would suit and hit all, and answer every *End* of *Nature*; but such a gradual *Increase* and *Decrease* of *Heat* as now there is. I must not descend to the *Animal* World, where the *Inconveniences* would be as many and as great as in the *Vegetable*: and such a Situation of the *Sun* and *Earth* as that which the *Theorist* supposes, is so far from being preferable to *this* which at present obtains, that this hath infinitely the *Advantage* of it in all respects.

Be that how it will, for I have no need to insist upon it, but may take the thing in his way, and suppose that such a *Temperature* would have
all

all the happy Effects that he expects from it; yet there is one very considerable *Phænomenon* of the Vegetable Remains of *that Earth*, which affords us a sure and plain Indication that there was not then any such *Temperature*. From *these* it clearly appears that there was the same *Order* and *Succession* of Things upon the *Face* of the *Earth* that there is at *this time*. Now this *Succession* being, as we have seen, caused meerly by the *Variation* of the *Sun's Heat*, it must needs follow, that there was *then* the same *Variations* of it, and consequently the same *Alternations* of *Seasons*, that *now* there is. Had there been an *Equality* of *Heat*, if we grant that it could have produced all the *Plants* in Nature, which 'tis impossible it ever should, it must have done it *indifferently* and *uncertainly*. There could be no reason why they should flourish at any *one set time* rather than *another*; that's peculiarly the Effect of the *Sun's Variation*. So that they must needs have been all in *Confusion*; and this *Succession* of *Things* would have been quite overturned. The *Plants* which
now

now appear in the most *different* and *distant* Seasons, would have been all in *Prime*, and flourishing *together* at the *same time*. So that they would have had *February* and *May*, *July* and *September*, all in one Scene. Nay, the several *Individuals* of the *same kind* must have been as greatly at odds: one arrived to *Seed*, and that fully *ripe*, and ready to *shed*, whilst another was not so much as come to *Flower*, but in as differing a *State* and *Hue* as could be. In brief, there would have been all the *Diversity*, *Uncertainty*, and *Disorder*, in the *Vegetable Kingdom* that can well be conceived. Which indeed is no more than what he freely owns: telling us that then *Every Season was a Seed-time to Nature, and every Season an Harvest*. This is what he does, and must grant: and this is as much as is needful for the overturning *his Hypothesis*. For the *Vegetable Remains* of *that Earth* say no such thing: they give not any the least *Countenance* to these *Conjectures*, but the quite contrary; and *these*, being many of them enclosed in very fine and close Stone, are *preserved*

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ved to this day very curiously and entire to Admiration. By *them* we may easily judge how Things *then* stood. And there is so great an Uniformity, and general Consent amongst them, that from it I was enabled to discover

† Gen. vii. 11. In the second Month, the seventeenth day of the Month, were all the Fountains of the great Deep broken up, and the windows of Heaven were opened. Moses writing to the Jews his Country-men, makes use of the Form of the Year then receiving amongst them, which was indeed the first and most ancient, but had been disused during the time of their Abode in Egypt, and but newly re-established when this was wrote. [Exod. xii. 2.] In this, Nisan, or, as 'twas also call'd, Adid was the first Month: and Ijar the second, upon the 17th day whereof the waters of the Deluge came forth, according to this Relation. And truly that time (which is not a little remarkable) falls within the Compass here chalk'd out by Nature so very punctually, that one can scarcely forbear concluding that these Strokes and Lines of Nature, and those of that Relation, came both from the same Hand; but this only by the by. The Particulars of the Computation I here use shall be given at full elsewhere, they being too bulky for this place.

* Conf. Part 3. Sect. 2. Conf. 5.

what Time of the Year it was that the Deluge began †; the whole Tenour of these Bodies thus preserved clearly pointing forth the Month of May*. Nor have I ever met with so much as one single Plant; or other Body, amongst all those vast multitudes which I have carefully viewed, that is peculiar to any other Season of the Year: or any thing that falls out earlier or later: any of them short, or any further advanc'd in

Growth,

Growth, Seed, or the like, than they now usually are in *that Month*; which assuredly could never have happened, had there really been such an *Equality of Seasons*, and constant *temperature* of Heat as is imagined by the *Theorist*. There are some *Phænomena* of the *Animal Remains* of *that Earth* which afford us more Arguments to the same purpose, and those not less concluding than the others; but these I shall wholly wave for the present, there being indeed no occasion to make use of them here.

I shall now only look a little into the *Mosaick Archives*, to observe what they furnish us with upon this Subject, and I have done; for I perceive I have, before I am aware, much exceeded the Measures I designed; which, on so copious a Subject, 'twas hard not to do. Gen. i. 14. *And God said, let there be LIGHTS in the Firmament of the Heaven, to divide the Day from the Night: and let them be for Signs, and for SEASONS, and for Days and Years.* This Passage, we see, does not at all favour the Opinion that there was no *Variation of Seasons* before the Deluge.

So far from it, that should a Man go about with never so set Study and Design to describe such a Natural *Form* of the *Year* as is that which is at present establish'd, he could scarcely ever do it in so few Words again that were so fit and proper, so full and express; especially if, by *Signs*, in this place, *Months* are intended; for then we have here, first the *Year*: and that subdivided into its usual Parts, the four Quarters or *Seasons*, the twelve *Signs* or Months, and *Days*. Nay at the same time, from the 19th Verse, we learn that *this Establishment* is, within four days, as old as the World. But further, Gen. viii. 21, 22. *And the Lord said in his heart, I will not again curse the ground, --- neither will I again smite any more every thing living as I have done. While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night, shall not cease.* This was pronounc'd upon *Noah's* Sacrificing, at his coming forth of the Ark, after the *Deluge* was over: and implies, that there had indeed then lately been a mighty *Confusion* of Things, for the time: an Interruption
and

and Perturbation of the *ordinary Course* of them : and a Cessation and Suspension of the *Laws of Nature* : but withall gives Security and Assurance that there should never be the like any more to the End of the World : that for the future they should all run again in their old Chancel : and that particularly there should be the same *Vicissitudes of Seasons, and Alternations of Heat and Cold* that were before the Deluge.

FINIS,

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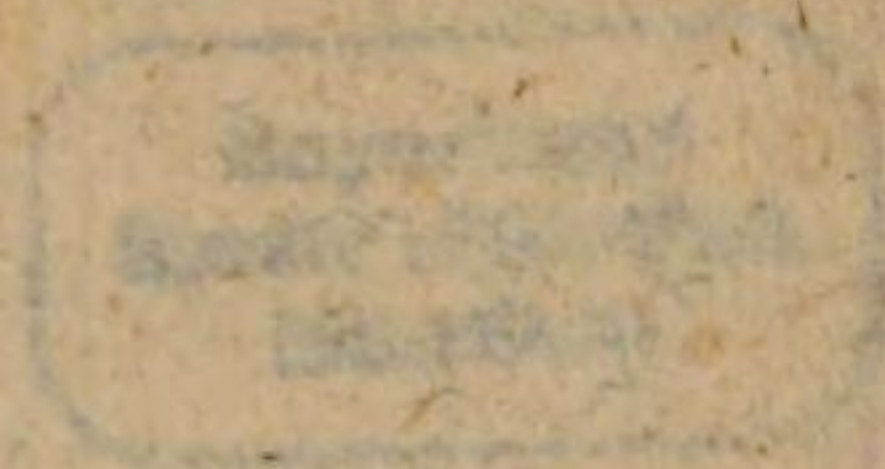
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